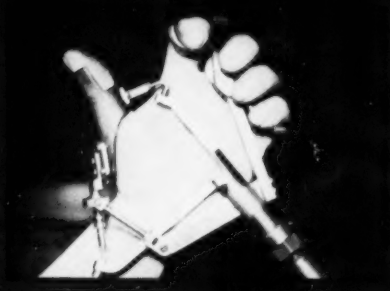
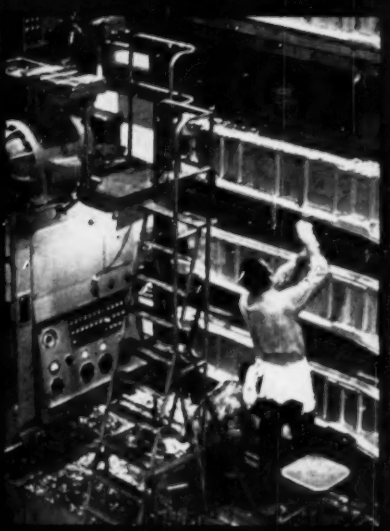
OVERSEAS EDITION
SEPTEMBER 1954

# DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY





**DEVICES** like this one promote proper exercises; help injured Vauxhall workers recover faster. On-the-iob program cuts lost time . . . . . p11

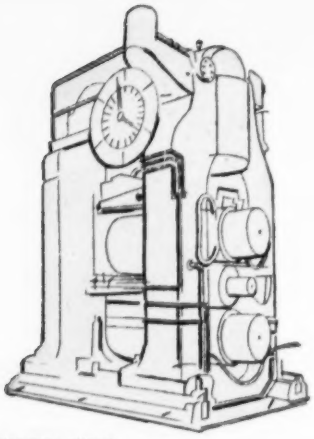
**CONSTRUCTION EQUIPMENT** is changing the earth's face. Booming industry expands its markets; plans new and better machines . . . . . p13

**FIRE MENACES** even "fireproof" plants. New program reaches for super-safety in plant design. . . . . p20

**CHEMICAL CLEANING** proves the answer for most process equipment internal-cleaning problems . . . . . p24

**GOOD IDEAS** from one industry can be adapted by others. Your plant can borrow from the aircraft industry . p28

**HELICOPTERS** are penetrating civilian air-freight and passenger service. New designs include 40-passenger model and one-man helicopter . . . . . p35



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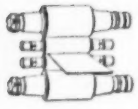

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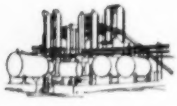

**CHEMICAL PLANTS**
Engineers and constructors of chemical, petrochemical, petroleum and atomic energy plants.

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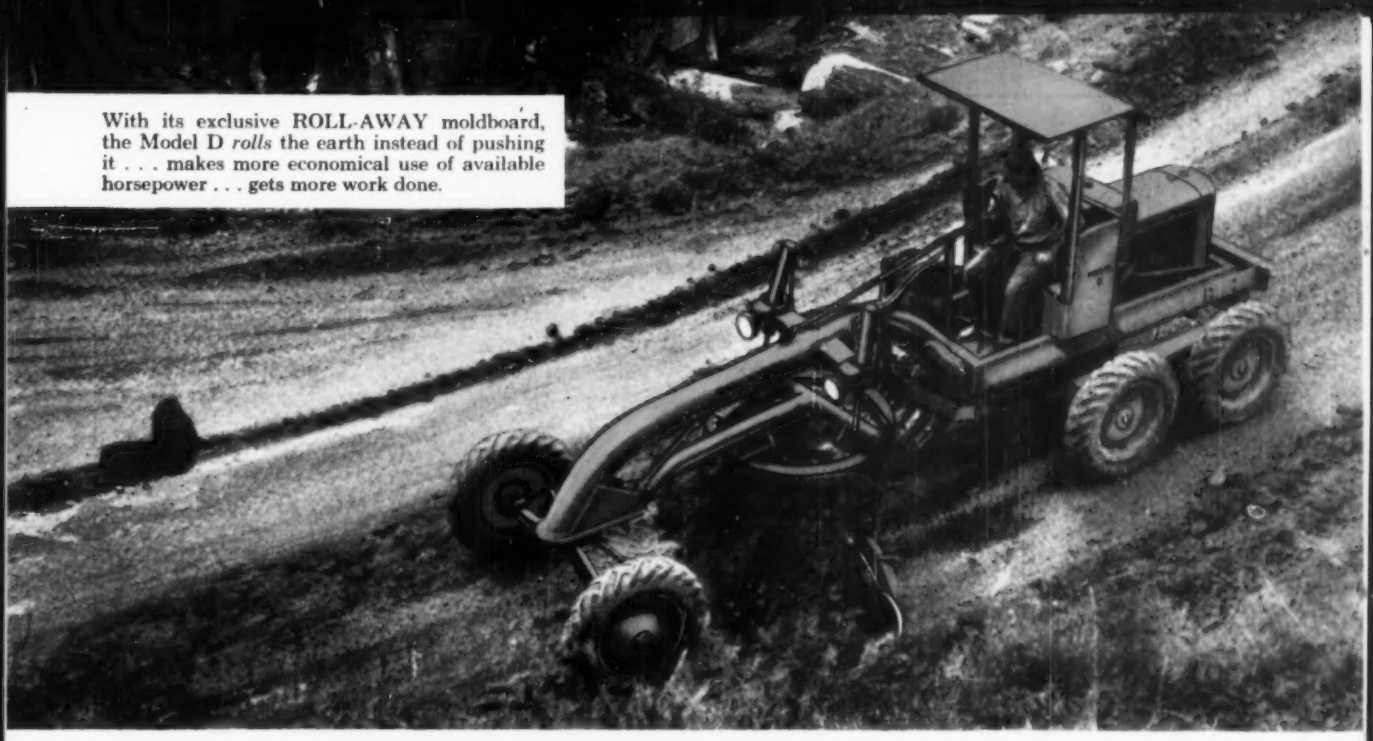

With its exclusive ROLL-AWAY moldboard, the Model D *rolls* the earth instead of pushing it . . . makes more economical use of available horsepower . . . gets more work done.

# Versatile Model D Motor Grader Stretches Road Budgets

The Allis-Chalmers Model D Motor Grader is a multi-purpose machine for road maintenance and light construction work. With a price only one-third that of a larger grader, and correspondingly low upkeep costs, this popular unit is meeting the needs of many communities having limited road budgets.

With a powerful engine, backed by the sure-footed tandem drive, this versatile motor grader handles leveling, grading, ditching and sloping tasks. With its compact design, it works in restricted quarters where larger graders could not operate.

The Model D also has a number of easily mounted attachments that broaden its usefulness, including a scarifier and hydraulic rear-mounted loader. Leaning front wheels, and equipment which makes possible a complete circle turn of the blade, are also available, if desired.

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ROLL-AWAY is an Allis-Chalmers trademark.

**HEAVY-DUTY AD-40 MOTOR GRADER** For heavy-duty construction work, Allis-Chalmers recommends the 104-brake hp, diesel-powered Model AD-40, illustrated below.

With hydraulic bucket, the Model D eliminates the need for a special loader . . . loads earth directly into trucks.

**AD-40 MOTOR GRADER**

Weight, 23,000 lb
Forward speeds — 0 to 20.4 mph
Reverse speeds — 0 to 7.0 mph

**MODEL D MOTOR GRADER**

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## Asphalt spreader screws now work five years *despite heat, corrosion, abrasion*

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# McGRAW-HILL DIGEST

*. . . the best from 48 business magazines—see p48*

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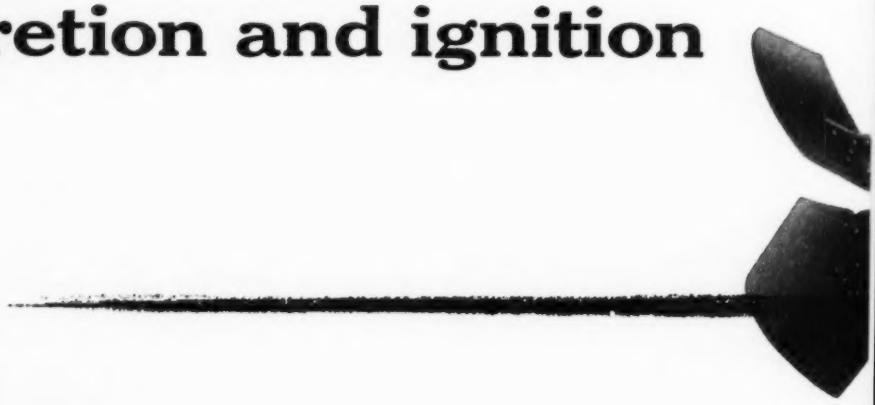

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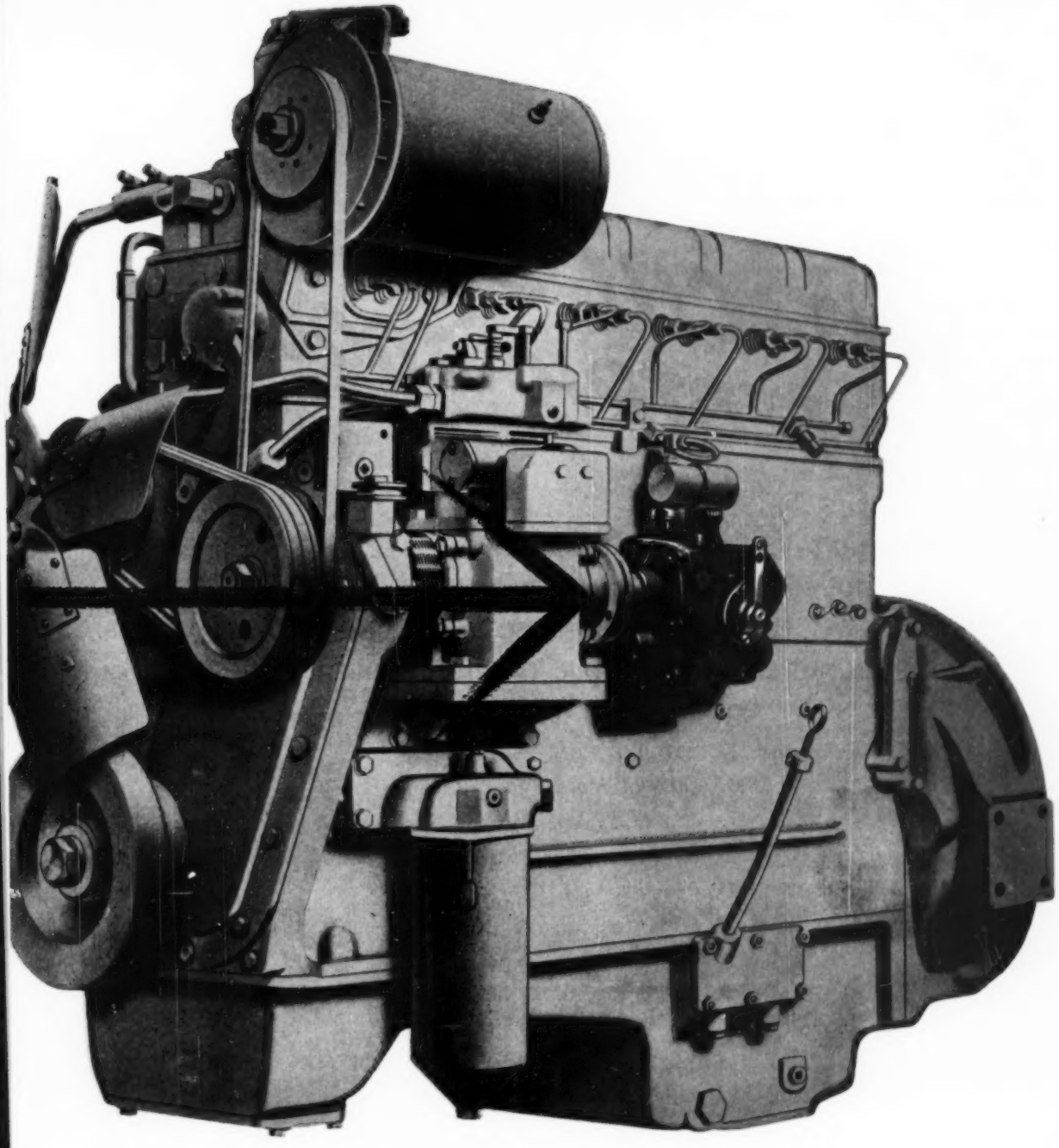

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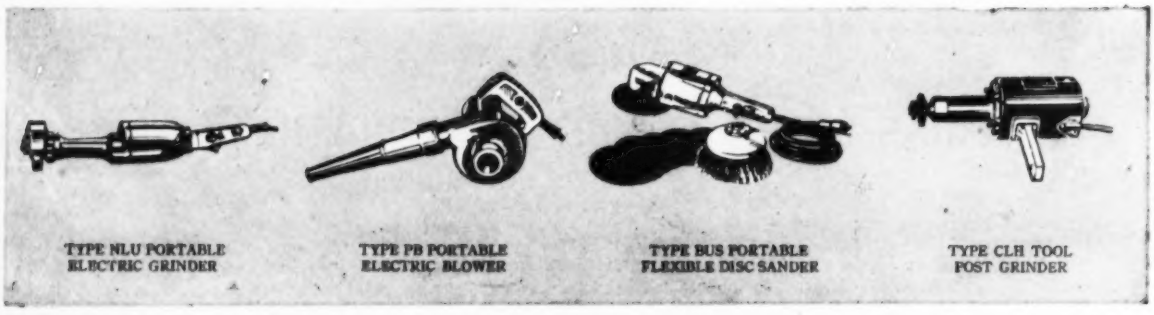


TYPE NLU PORTABLE
ELECTRIC GRINDER

TYPE PB PORTABLE
ELECTRIC BLOWER

TYPE BUS PORTABLE
FLEXIBLE DISC SANDER

TYPE CLH TOOL
POST GRINDER

# BUSINESS TRENDS

**THE YEAR AHEAD** will show steady expansion in U. S. business. The next 15 years, on the basis of expected population and productivity gains, may see economic expansion exceeding 50%. These are major conclusions of latest economic surveys.

**Trends for 1954-55** have been calculated by White House advisers. Here, briefly, is what they've been telling Eisenhower: The business downtrend, largely inventory adjustment, ended in the spring, leveled off this summer, and will now give way to rising production and employment. Consensus is the rise will be moderate but sustained.

**Three main factors** are behind this thinking:

1. **Plant and equipment investment.** It's not clear yet whether manufacturers' investments, as forecast earlier (McGraw-Hill Digest, June, p7), will rival 1953's. But all industry's capital outlays, while under last year's all-time records, are still high and may turn upward this month.
2. **Consumer spending.** Aided by tax cuts (which offset payroll declines), consumers have had just as much to spend this year as last—and have even boosted spending slightly. This trend is expected to continue.
3. **Public works spending.** State and local outlays are on the upgrade, substantially countering Federal cuts.

**Summing up,** the President's advisers feel the above factors will more than offset defense-spending cuts in the coming year, setting the stage for another growth period.

**BETWEEN NOW AND 1970,** the U. S. gross national product (value of all goods and services produced) probably will grow from $367-billion, to about $560-billion, up 52½%. This is the top finding of the latest long-range survey completed by McGraw-Hill Publishing Co.'s Economic Dept.

**This tremendous potential expansion** is based on continuance of certain historic trends—since 1930, gross national product has risen an average 3% yearly; goods produced and consumed have about doubled every 25 years. Specifically, it would stem from two major growth factors:

- **Population**—This will increase from 156-million to over 200-million. The labor force will rise from 65-million to 82-million.
- **Productivity**—From 1930 to 1950, productivity (output per man-hour) rose about 2% yearly; trend in next 2 decades is toward 2.5% annual gains (average work week will probably shorten from 41 to 35 hours).

**Behind the productivity rise** will be advancing technology, spurred by huge research outlays (now $3-billion yearly against $1-billion a decade ago). The result will be a whole series of industrial revolutions. For example:

1. **Tomorrow's factories** will make maximum use of plastics and fluid metals that can be molded or poured in continuous operations, rather than cut into shape by machining. Where cutting is needed, it will be done by batteries of interconnected tools, not by men working at separate machines. Just as the machinist replaced the handcraftsman, so the machine supervisor, watching over a large section of automatic equipment, will take over production lines.
2. **In steel,** fast stamping and shearing operations will be linked up with rolling mills to process hot metal moving at 2,000 ft. per min.
3. **Within factories,** all materials will be handled automatically. The long-range trend is toward high-speed conveyor systems connecting almost all machines.

**The impact of all this** upon key segments of the economy may be gaged by these probabilities:

**Capital Goods**—Annual replacement and modernization may cost $40-billion by 1970, up 43%.

**Public Works**—Hospitals and elementary schools will have to be doubled, highway outlays more than doubled.

**Power and Fuel**—Electricity consumption will triple, oil consumption double.

**Chemicals**—Production will probably jump 150%.

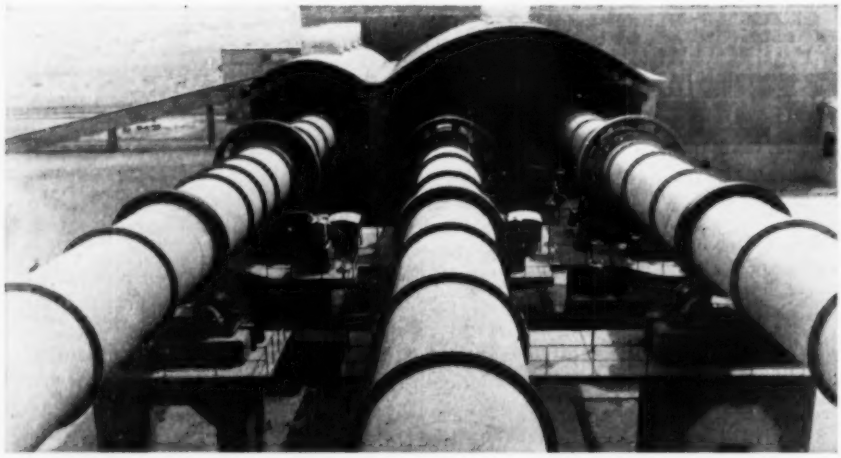
**Housing**—The greatest improvement in American living standards by 1970 is likely to be in housing. Mass production, whether factory prefabrication or large-scale fabrication at the site—will bring costs down. Higher incomes will mean bigger homes, better quality. Most new homes will be completely air-conditioned and electrically heated. Color TV sets may be built into half the rooms.

**Private Transportation**—Passenger-car output by 1970 will probably reach 7.5-million, against 6.2-million in 1953. There may also be a big market for personal planes.

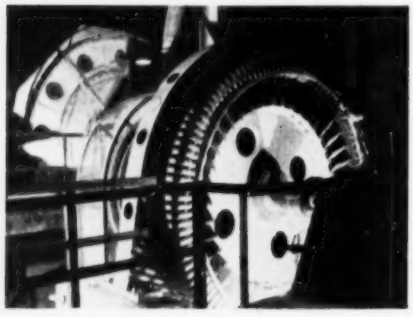
**Recreation**—Increased leisure will mean more public amusements, sports, travel. By 1970, helicopter service (see page 35) may rival bus travel. Jet planes, cutting time and fatigue, will extend holiday areas across oceans and continents.

# Efficient cement-making accelerates industrial progress

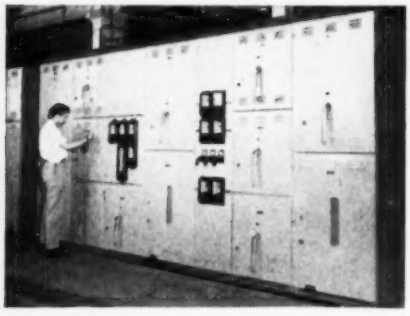
In addition to the equipment shown here, Allis-Chalmers builds crushers, grinding mills, screens and electrical equipment for cement-makers. In fact, Allis-Chalmers builds machinery that helps all industries improve processing of raw materials . . . builds equipment which provides the power to help people everywhere produce more, have more—live better.



**INCREASED PRODUCTION** made possible by modern cement plants equipped with Allis-Chalmers Rotary Kilns—means more cement to build modern cities . . . more cement for the facilities to link these cities—highways, airports, docks.



**LOWERS COST**—this thousand-horsepower motor is only one of the many Allis-Chalmers motors used for economical cement making. It helps make best possible use of available power . . . helps produce more cement at lower over-all cost per ton.



**IMPROVES QUALITY**—with each cement-making function regulated by Allis-Chalmers switchgear, processing is precisely controlled. The result is a product of more uniform quality.

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# INTERNATIONAL TRENDS

**WASHINGTON**—President Eisenhower's order raising watch tariffs, the first major retreat in U. S. trade liberalization policies since the Thirties, has had wide repercussions.

**At home, it has encouraged** a flood of new applications for duty boosts. Abroad, it has shaken confidence in the stability and predictability of U. S. trade policies. One result may be to dim hopes of convertibility this year or next.

**But the step does not represent** any fundamental change in Administration policies. Observers here feel that Eisenhower, in a specific case, yielded to political pressures in an election year, buttressed by the watch industry's defense role. While a few other tariff rises may be in the offing, no major policy reversal is probable.

**The big test on the tariff issue** will come when new legislation reaches Congress next year. Here the outcome may depend on the forthcoming election. Should the Republicans retain control of Congress, protectionists will seek to bring new pressures on the Administration. Should the Democrats win, they will be able to play an effective role in supporting trade liberalization.

**LATIN AMERICA**—Consuming 6-million but producing only about 2-million tons yearly, this continent is striving for steel self-sufficiency. Major motivations are—(1) industrialization, keyed to steel; (2) foreign-exchange economies.

• **Colombia**—By the year-end, the National Steel Co.'s new $100-million integrated plant at Belencito will be heading toward its initial 145,000-ton capacity. Using plentiful local ore, it will fill Colombia's need for many steel types by 1955. Estimated annual exchange savings: $20-million. U. S., French, German and Mexican engineers cooperated in building the plant.

• **Brazil**—The continent's biggest steel maker, Brazil produced 982,000 tons in 1953 and expects 1.4-million this year. In 10 years, the Volta Redonda plant in Rio de Janeiro state has tripled output to 700,000 tons; current planning, including a $25-million capital increase, aims at 1-million tons. Besides six other existing integrated plants, new steel-mill projects are planned in five states.

• **Argentina**—Keystone of a future integrated steel industry is the 400,000-ton capacity rolling mill bought in U. S. last spring and slated to begin operations at San Nicolas in 3 years. It will roll steel imported from Chile. Because of local ore and coal shortages, furnaces for making crude steel—to be put in later—will probably use Peruvian ore and anthracite fuel mixed with asphalt. Existing mills have a 300,000-ton finished-steel capacity but must import all but 40,000 tons of pig iron.

• **Chile**—The Huachipato plant, launched 4 years ago with a 220,000-ton capacity, is being expanded to 350,000 tons. It supplies 80% of Chile's needs while exporting 35% of output.

• **Venezuela**—A $60-million mill with 150,000-ton capacity will be built on the Orinoco River, near U. S. Steel's iron ore fields. Production is slated to begin in 1958. Country now uses 600,000 tons of steel yearly, all imported.

• **Peru**—New integrated plant at Chimbote, due to start operations in 1955-56 with a 60,000-ton capacity, is expected to fill 60% of Peru's needs and save $7-million exchange. Because of the lack of coking coal, electric power will be used for both ore reduction and steel-making.

**WASHINGTON**—U. S. will speed efforts to strengthen the Middle East, both economically and militarily, to offset losses in Southeast Asia.

**Egypt will get** about $26-million in economic aid following completion of the Suez settlement. Military aid will follow. Iran will receive a big loan to tide its economy over until oil revenues come in. These will be substantial—$80-million net the first year, about $180-million in the third.

**More U. S. aid** may also be funnelled to French North Africa, through Paris, if the French extend political reforms in Tunisia and Morocco. This aid would be focussed on housing, health, sanitation and education for low-income groups.

**WORLDWIDE**—Rome: Finmeccanica, government-controlled company embracing 40 major Italian industrial firms, has opened New York offices: goal—to obtain rights to U. S. developed patents and processes. . . . New Delhi: India's government will invite global tenders in Jan. 1955 for construction work on the $210-million-ton capacity Rourkela steel plant, its biggest venture to date; the Krupp-Demag report on process and layout has been adopted. . . . Salisbury: The Central African Federation government has announced a $200-million 3-yr. plan including $84-million for communications and transport and $43-million for a hydroelectric project; French engineers will advise on location of the latter.

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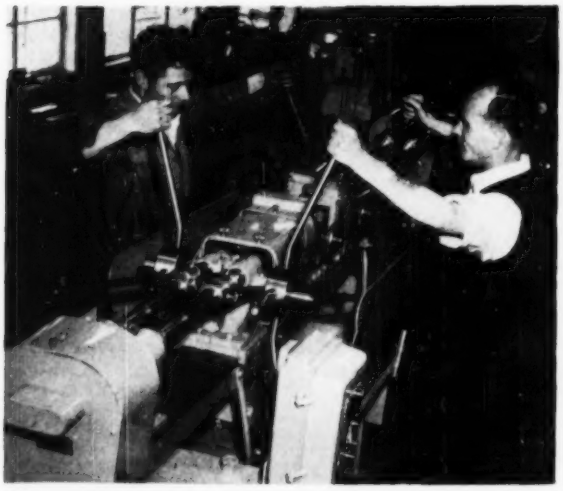
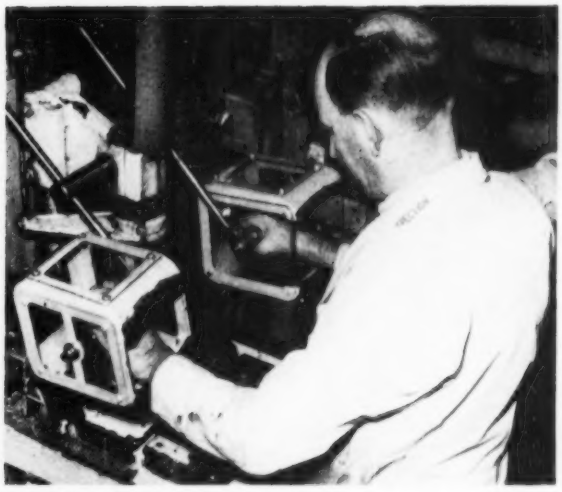


HORIZONTAL drill presses, specially built, exercise the shoulder and upper-back muscles of the operators.



WARM AIR, directed into plastic boxes around press levers, provides heat for arthritic patient.

# Better Employee Relations . . .

**. . . at Vauxhall Motors in England are a direct benefit from its industrial rehabilitation program. It helps both company and injured employees by reducing lost working time.—An original Digest article**

LONDON—Sound industrial relations mean far more than just agreement at the bargaining table. They reach into the fields of better employee-employer relations, community relations, even new methods and techniques, and improved production operations. And, in doing so, they can offer benefits far exceeding those gained from unimaginative programs.

**Such has been the case** with industrial rehabilitation at Vauxhall Motors Ltd., Luton, England. The program's purpose is to get injured or sick employees back to work with a minimum of time lost.

Basically, what the program set out to do, and has done successfully, is to work with the doctors, both at Vauxhall and the local hospital in Luton. When a worker is sick or injured, the Vauxhall scheme is explained fully to him.

**He's told** that while he is recovering he can do useful work and, at the same time, get the kind of exercise that will be most beneficial to him and speed his recovery. He's told too that he will be paid the regular wage scale plus 15% in lieu of regular shop bonuses, but that he need not take part in the program if he does not want to. Very few refuse.

Once the employee accepts the company's offer, Vauxhall medical and rehabilitation officials check with hospital medical men to find out just what kind of work and exercise the injured man can and should do. Then they see if there is a standard machine or operation that will serve the purpose.

**If there is,** he is put on it, either in the retraining shop or in the plant itself, depending on how close the medical supervision should be. If there is no such standard operation, Vauxhall modifies standard production units in its retraining shop.

The decline in working time lost from injuries or sickness measures the success of the rehabilitation program. For some injuries, days lost from work have dived to one-tenth the average lost time for such injuries before the program went into effect.

For wrist and ankle fractures, the average time lost (over a 2½-year period) was only 6½ days. In the 2 years before the program started, the average time lost for similar fractures was 57 days.

**Since the program began,** some 3,000 employees have gone through the retraining shop. Here, on both standard and specially equipped production equipment,

## *"The real profit (to Vauxhall) . . . has been considerable."*

they all work a full-time shift.

Nearly all the brake linings for Vauxhall's 500 cars and trucks made each day are riveted by patients.

While it is true that production here costs the company more than it would in the shop itself, the actual net cost over the years has been small. The real profit, though difficult to measure statistically, has been considerable.

**The 3,000 men** that have gone through the retraining center and are now back in the plant proper are all, in effect, public-relations men for Vauxhall. They have had unusual treatment. They know it, and they tell others about it. Another 3,000, who have been "retrained" in the plant itself, have been helped by being moved to different machines.

These 6,000 workers tell their story, not only to fellow-workers, but in the community as well. Many, if unemployed and sitting at home brooding, might never have recovered to the extent where they could do useful full-time work.

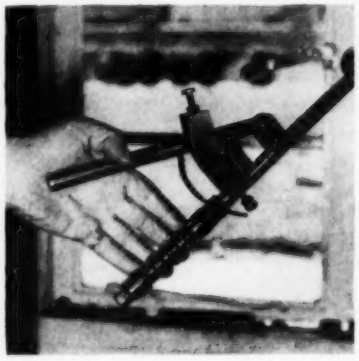
**The program** has been one where cooperation has always been the key word. Labor unions were in on its development from the start. Relations with them have been satisfactory throughout and continue to be so. The company is not compelled to put a man through the rehabilitation scheme, though very rarely does it fail to find employment for an applicant.

Treatment, in many cases, is simply a matter of giving the right kind of exercise, such as that, for example, a worker gets when he reaches up to pull down the safety cover on a small punch press, or when he bends over to pick up a piece of sheet steel.

**Only about** 40% of the total 6,000 rehabilitated workers required special equipment. This takes many forms:

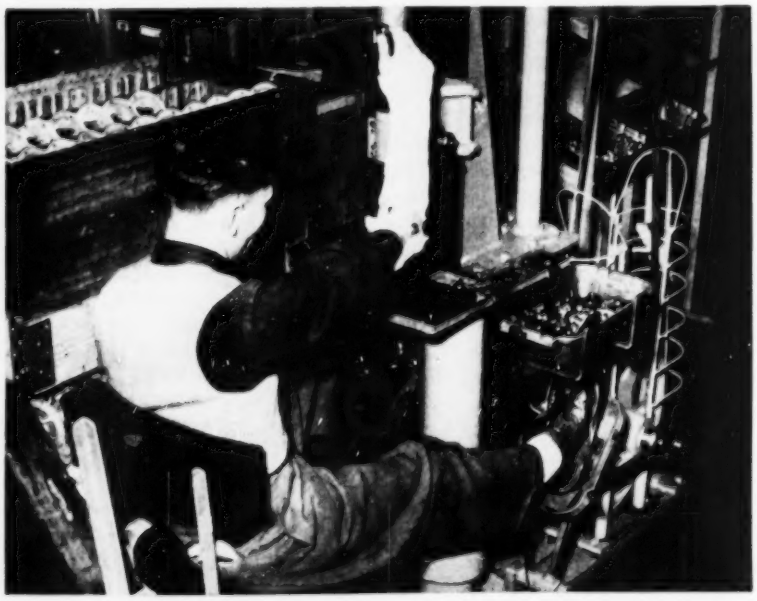
- Special grips, usually on drill presses, that require the operator to flex his thumb or extend it in order to operate the press.
- A plastic box, around the grip, that receives warm air.
- A thin steel rod set high, upon which small parts are stored for the man who must exercise neck muscles regularly (he looks up after each operation, then down again as he tools another).
- Special boots that allow a man with a broken ankle to walk.
- Special pedals on machines for men that must extend their legs out fully and then flex them back regularly.
- Specially built, horizontally opposed pairs of drill presses with special levers for the man that must work his shoulder muscles by reaching both arms to the sides and pulling inward.
- Special plastic splints of every description to give greater freedom of movement.
- Special steel and leather splints that allow a patient with a broken lower leg to walk normally and flex the knee.

**This special equipment** is designed and made in the rehabilitation shop by the patients themselves. All that the doctors have done in these cases is to say what can move, what cannot, and how. Engineers then set out to meet these requirements. Some of the results have astounded the doctors, but not the engineers.



**ROLLER GRIP on lever flexes and extends fingers following laceration.**

**PLASTIC SPLINT encourages finger stretching of injured patient.**



**ABOUT 70% of rehabilitated employees have been injured outside working hours. This patient, hurt in a motor-cycle accident, is exercising arm and leg.**

More and better tools help man improve his environment. It's boom time for the world's construction-equipment industry.—An original Digest article

INTERNATIONAL HARVESTER crawler tractor cuts a road at more than 1½-mile elevation.

# Machines Change Earth's Face

THE CONSTRUCTION INDUSTRY, more than any other, is changing the earth's face. Dams, bridges, highways, buildings, tunnels, all over the world, show man's desire for better living through revamping nature. In industry's terms, construction is booming. Behind the construction industry, there is another industry that is also booming. It supplies the tools—construction equipment and machinery—for the face lifting.

The tools must lift, excavate, handle materials faster and in greater quantities than possible by human means. Today's emphasis is on speed and capacity. Projects are getting more complex, more ambitious and construction equipment is staying abreast of the need.

**In the U. S.,** construction equipment is getting bigger, and it is also getting smaller. It's getting bigger because of the drive for higher output—big jobs demand big machines. It's getting smaller because of the need for specialization.

Small tractor-dozers reach places their larger counterparts cannot begin to reach. Specialized trenchers dig ditches for home foundations, sewer lines, water-supply lines. Bituminous pavers come in small sizes so that even small jobs may be mechanized.

More and more equipment is being made available with power-operated controls. Hydraulic systems provide power at the operator's fingertips for lifting, pushing, steering, opening, closing. Operator fatigue is cut; better control and production result.

**Torque converters,** between engine and load, protect engines and equipment from shock loads. They make better use of the engine's horsepower and cut fuel consumption. You will see more torque converters on equipment as time goes by.

Materials handling on the job is getting more mechanized. Motorized buggies haul everything from concrete to bricks. They will speed any building job.

The U. S. manufacturers have set their sights on more power, capacity, and speed. These are the three factors that reduce costs and speed construction. At the same time, where specialization is needed, the right equipment for the job will be available.

**Manufacturing industries** are buying construction equipment. It's a developing trend that last year took about 10% of equipment production.

Factories are using construction

LE TOURNEAU electrically powered and controlled tractor has special blade for clearing brush and stacking timber. All four wheels are powered.

HOUGH PAYLOADER is fitted with special blade to clean railroad tracks.

ENGLISH LOADER by Merton loads rock. Fordson tractor mounts unit.

TWO ALLIS-CHALMERS crawler-tractors haul huge elevating grader. Grader dumps material into trucks. Operation is part of highway earthmoving job.

equipment in a variety of ways—not all of them in the construction field. Types most often bought are either for lifting or handling materials. More than a few modern plants have a mobile crane and front-end loaders. And they are kept busy.

As yet there is no trend showing equipment makers designing with the needs of manufacturing industries specifically in mind. It seems factory managements have had little trouble adapting equipment to any peculiar plant requirements.

**A reverse twist** on this situation is the use of fork trucks—normally considered factory equipment—in construction. Besides their usual materials-handling functions, fork trucks have appeared in somewhat unusual occupations. Most reflect the ingenuity of the contractors. Pile drivers have been mounted on fork trucks for placing piles where overhead space is restricted. Another job saw fork trucks place roof trusses. The contractor decided they were the most practical tool for the job.

There has been a considerable number of mergers among U. S. equipment manufacturers. And more are expected. Through mergers the companies have expanded their lines to include a wide range of equipment. Those companies that have not consolidated are hard at work on new products and improvements of present models.

**The reason** behind this activity is simple. The companies involved expect to round out their lines, present a bigger and better package of equipment to their customers. If you buy equipment, you will find better machines and a wider selection to choose from. As the manufacturers extend their lines, parts will become standardized. Your parts stocking and maintenance problems will become simpler. And, in the long run, you will be able to buy all or most of your equipment from one maker.

About 15% of the industry's output went abroad last year. About a third went to Latin America with Europe, Asia, and other areas (Africa, Australia) next in importance. Exports represent an important part of the U. S. manufacturers' business—last year nearly $400-million.

**Latin America** offers a sure market for construction equipment. The Latins will buy equipment as long as money is available and terms are favorable.

One trend has about run its

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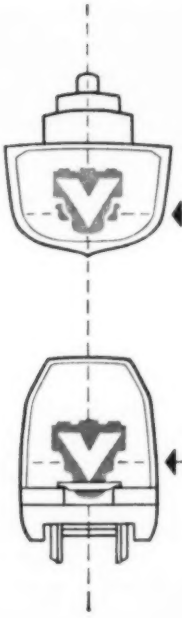

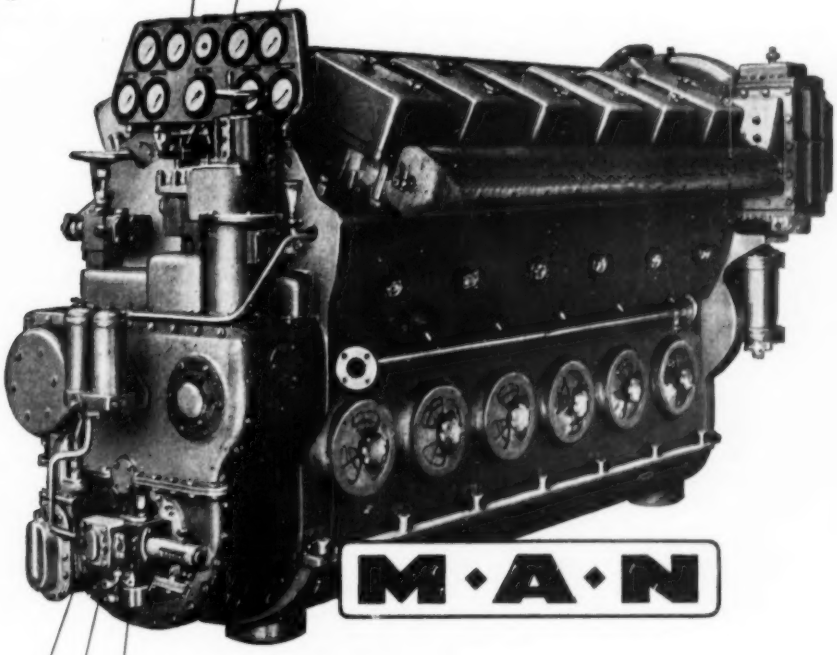

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course. Five years ago, federal, state and local governments bought most of the equipment. Today, private contractors buy about 70% of the equipment sold. Government is pulling out of construction activity and is encouraging private contractors to boost their business.

## U. S. Equipment Favored

Most of the equipment bought comes from the U. S. American shovels, tractors, motor graders, scrapers, asphalt plants, concrete pavers and large mixers, and other heavy-duty equipment are without competition as far as most Latin American buyers are concerned. But competition from European manufacturers is getting fiercer. They have a determined effort underway to expand their share of Latin America's markets. Their advantage is not in equipment types but in terms of trade and the exchange situation. U. S. prices are high, and credit terms short.

**European manufacturers** are active in Brazil. So far, their line consists of compressed-air equipment, diesel and electric generating sets, and small construction tools. And business has been good —they've sold a lot of equipment and expect to sell more. Some German and Italian trucks have been bought by Brazilians. An English firm has sold a few road rollers.

Brazilian manufacturers have begun production of some kinds of equipment. As yet they have not become important, and they have limited themselves to the smaller types. Small and medium-sized concrete mixers are made by Brazilian manufacturers as well as small road rollers and small tamping rollers. Only the concrete mixers are produced in anything like quantity.

**Other Latin American countries** present an equally bright market picture. Practically every country has a string of major construction projects underway. And huge quantities of equipment are needed.

Venezuela imports about 100% of its equipment. But two U.S. companies are building plants. Westinghouse-Le Tourneau will assemble earthmoving machinery. General Motors plans a truck assembly plant, which eventually will make entire trucks rather than just assemble them from imported components.

**Colombia supplies** about 15% of its needs through home-built equipment. For the future, it expects to have an industry that will meet 90% of its requirements.

Argentina also supplies most of its own needs, but will continue to import a good deal of equipment. Other countries depend for the most part on imports and likely will remain in that situation for some time to come.

**Overseas,** West Germany and England have active construction-equipment industries. West Germany's construction volume reached the $3.56-billion mark in 1953. This year a 7 to 10% increase is expected. Construction-equipment sales were pegged at $53-million. In 1954, an increase paralleling the increase in construction activity is expected.

About 34.5% of the industry's total production was exported last year. Most went to countries in Europe, Latin America, and the Near East. The Germans are actively engaged in pushing sales of their equipment overseas—particularly in Latin America. One German manufacturer, to help promote his equipment, gave 20 farm tractors to Colombia.

**Machines turned out** by the German manufacturers include crushing and screening plants, concrete mixers, dredges, rollers, pile drivers, tractors, and bituminous pavers. The war set back the German industry considerably. It is still in the process of catching up with the rest of the world. At present, there is considerable emphasis on mechanizing building construction. Most German cities are visually dominated by rotary-tower cranes.

Bulldozers and scrapers are now being built in Germany. Before and during the war, most earthmoving was done with dump cars hauled by steam or diesel locomotives.

**The Germans** are also introducing U.S.-style front-end loaders. More mechanization is going into asphalt plants. Before the war, a plant with 12 to 15 men produced 120 to 150 tons per day. Today's plants will produce 500 tons per day with only 4 or 5 men.

Other trends in the industry point to greater use of electricity to power equipment, better control and, in some cases, automatic control of equipment, and higher speed and production in mixing and processing plants.

**Britain's** construction volume approached $5-billion last year. This year should see a 4% increase in business. The construction-equipment industry has kept pace and will grow right along with construction activity.

British manufacturers turn out a wide range of equipment. About 50% of their total production is exported—chiefly to the sterling area. Latin America is normally a good market. But for the last 4 years, trading troubles with Argentina have meant that virtually nothing has gone there. In Brazil, credit problems have restricted business. The same is true of Continental Europe where import restrictions periodically cut markets—France and Finland are two current examples of this.

## The Trend: More Horsepower

The trend in British construction equipment is toward heavier and more complex machinery. It boils down simply to mechanization in an effort to raise the amount of horsepower behind the British construction worker.

Earthmoving equipment will continue to find its main outlet for future expansion overseas, particularly in Commonwealth countries. British contractors have completed a number of projects in Bombay, Travancore, and Karachi.

Australia and New Zealand have drawn British contractors and their equipment at a steady rate. With enormous development potentialities and favorable working conditions, the next few years should see considerable British expansion there.

## Metal Cleaners Remove Glaze from Cylinders

In reringing diesel, gas or dual-fuel engines, one of the chief problems is how to remove high glaze from the cylinder walls so that the new piston rings will seat properly. In small engines, this can usually be done with a portable hone. But honing large cylinders in a maintenance shop is impractical.

**Liquid metal cleaners** have now solved this old problem. There are two types on the market: Metal-Prep, made by the Sherwin-Williams Co., and Adherit, made by Strathmore Products Co. Mixed half and half with water, both do the job satisfactorily, since they cause a light etching effect and remove the glaze entirely.

**Application** is as follows: roll solution over the entire cylinder wall with a roller brush. Let stand for 1 hr. Repeat twice. Then brush the wall with a motor-driven rotary wire brush. Complete the treatment by washing the walls down with water, using the rinsed roller brush.—Power, June, p134

## U. S. Air Force Announces New Titanium Alloy

After 3 years of research under U. S. Air Force sponsorship, Battelle Memorial Institute has developed a heat-treatable, high-strength, forgeable titanium alloy. Forging characteristics are excellent; response to heat treatment is better than that of any commercial alloy available.

**The 3Mn Complex alloy,** as it is called, contains 3% manganese with 1% each of chromium, iron, molybdenum, and vanadium. Tensile properties range from 135,000 lb. per sq. in. and 31% elongation to 220,000 lb. per sq. in. and 4% elongation. Impact properties are excellent.

Wyman-Gordon Co., in evaluating the alloy's forgeability, successfully forged gear blanks by heating to 1750°F. for 1 hr. and forging without reheat in two operations. Finishing temperature was 1500°F. Die fill was excellent.

**Suggested uses include:** Flywheels, turbine-compressor disks, pulleys, gears, structural members, aircraft bolts. It should find numerous uses as a titanium alloy to bridge the strength gap between steel and the common nonferrous alloys.—Prod Eng, July, p172

## Chemical Developments

► **C-Oil,** a petrochemical in semi-commercial production, is based on butadiene. It's expected to reduce dependence of paint manufacturers on linseed, soya and tung oils. Coatings made with C-Oil are resistant to alkalies, dilute acids, water, and oxygenated solvents. Maker is Standard Oil Co. of N. J.—June 19, p72

► **Polyethylene tubes,** made by a Swiss extrusion process, will soon be offered by Bradley Container Corp. The tubes will compete with metal collapsible tubes. Capacities will range from 4 cc. to 16 oz.—Chem Wk, July 3, p36

## Component Construction Technique for Builders

A new technique in small-homes construction promises to speed production, cut overhead, and provide flexibility of exterior finish. It is a system of pre-engineered structural components, standardized to a 4x8-ft. module.

**Basic components** are window and door wall units, trusses, and storage wall units. These components can be prefabricated and delivered ready for erection.

Other fabricated house components can easily be adapted to the system. These include interior door wall units, kitchen and bath units, sliding-door closets, built-in furniture, pre-finished wall, floor and ceiling material.

**One builder** who uses the system said, "We pay very little more than if we built the units ourselves. And in the long run we save money."—Am Builder, May, p82

## International Business Briefs

**London**—British industry is back in business again with Iran with a $14-million contract to supply 100,000 tons of rails and other railway equipment. British group's leader is United Steel Companies Ltd. Iranians get 5 years to pay. U. S., French, Belgian and German firms were outbid.

**Mexico City**—Mexican interests and the Kureha Spinning Co. of Osaga, Japan, will set up a joint $2,780,000 cotton-spinning factory here; it will start operations in 1955. Mexicans supply half the capital in land and buildings, Japanese the other half in equipment. Mexico's government guarantees remittance of Kureha profits.

**Riyad**—Saudi Arabian government is pushing a 5-million telecommunications plan which will (1) link the desert-oil-kingdom's cities by radiotelephone; (2) establish radiotelephone communication with the world; (3) give its cities automatic telephone exchanges. Siemens Co. of Munich is building a major radio station near Jeddah costing $2-million; General Electric Co., Ltd., Britain, will install automatic exchanges (beginning at Jeddah) costing $3-million.

**Bonn**—The Mexican "SCOP" railroad has ordered three self-propelled multiple-unit trains, each powered by two 450-hp. Maybach diesels, from Waggonfabrik Linke-Hofmann-Busch, Salzgitter . . . Heinrich Lanz & Co., Mannheim, and Fahrzeugbau, Wilhelmshaven, are respectively the German founders of two new Brazilian manufacturing firms—Lanz do Brasil S. A. (agricultural machinery) and Alimay Motors S. A. (busses, trucks, light airplanes).

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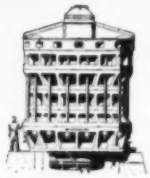

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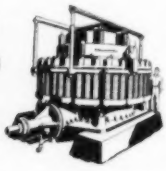

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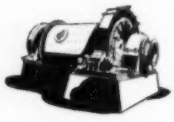

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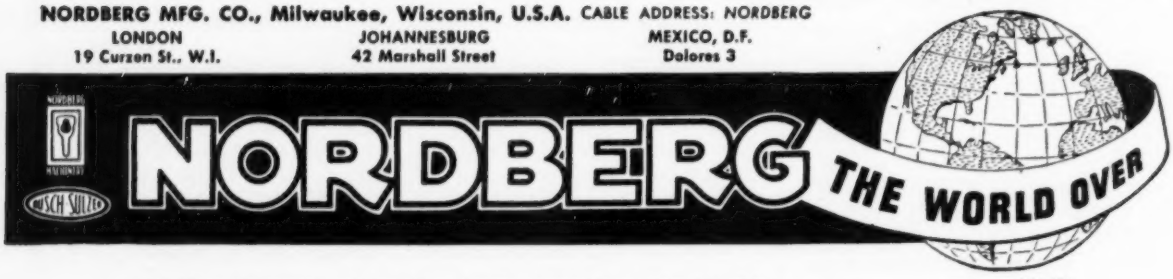


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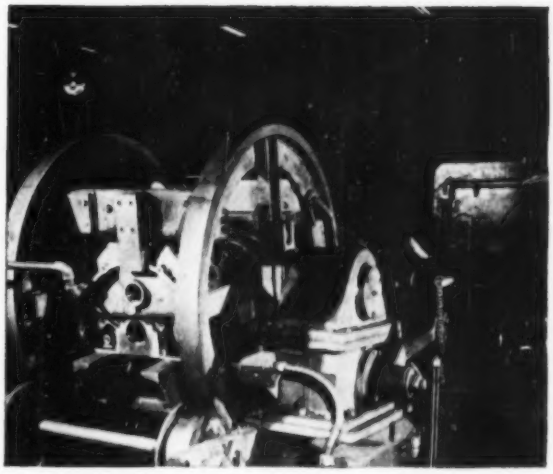
XM 154

# This Month's How To . . .



## . . . automate cylinder-block handling

In advanced techniques for handling overhead-valve V-8 engine cylinder blocks at Ford Motor Co.'s Dearborn plant, automation takes over loading and unloading so completely that workers' only function is to observe the operation of the machines.

The 180° turnover automation mechanism at right plays a key role at the junction of two major operations set up at right angles to each other.

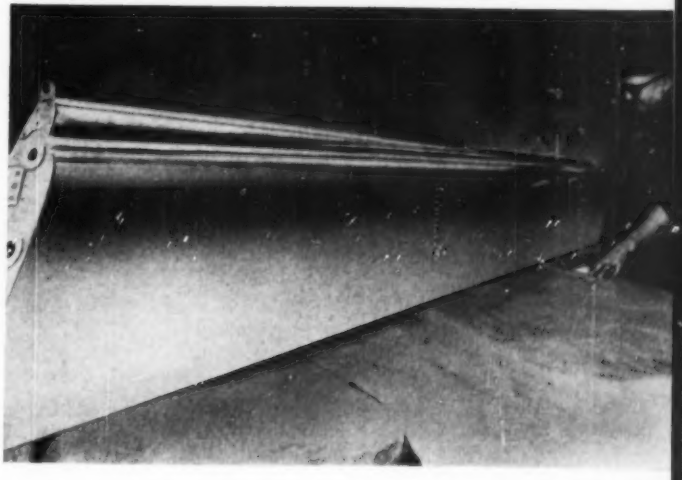
It receives blocks broadside from a machine at the left, turns them so the banks are in up position, then feeds them into the surface broaching machine at extreme right. Then it automatically returns to normal position, ready to receive the next block.—Auto Ind, June 15, p50

## . . . simplify case opening

Corrugated shipping containers can now be "zipped" open cleanly and rapidly. Two reasons account for success of the new containers: (1) damage to contents is reduced because opening tools are not needed, (2) manufacturers want to supply their customers with easy-to-open containers.

The case shown here is used by Quaker Oats Co. for its cereals. Slits in the case's inner liner channel the tear, which is started by a scored thumb notch at the top of the strip (left). The top lifts back like a hinged lid for easy marking and removal of the contents (right). Edge of flap has light spot gluing.

The variety of products being shipped in similar containers is almost endless.—Mod Packaging, June, p116

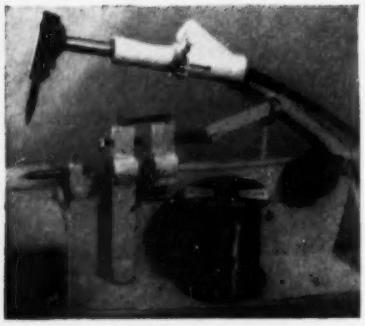


## . . . bond metals with epoxy resins

Skin and interior bracing of wing flap are bonded with epoxy adhesives by Societe Nationale de Construction Aeronautique de Sud Ouest. Advantages: retention of bonding strength to 180°F., only 4% shrinkage during curing, high chemical resistance, absence of placement-disturbing volatiles.

Epoxy adhesives come in three forms: (1) liquid, to which curing agent and filler are added by user; (2) paste, to which some curing agent has already been added; (3) solid stick, which is applied by rubbing on preheated parts.

Surface preparation depends on the metal. All oil must be removed. Aluminum is also etched with acid to aid "wetting" of the metal by the adhesive. —Prod Eng, July, p166



## Automatic Solderer

**Automatic soldering of small parts can be done at high speed on new soldering head made by Multicore Solders Ltd., Hemel Hempstead, Hertfordshire, England. Rosin-core solder, drawn from a 7-lb. reel, is automatically fed above the components held together on the anvil. Models can be operated by other machines, by pedal, or by built-in motor, with capacities up to 3,000 joints per hr.—Electronics, July, p252**

## Smart Product Design Cuts Production Costs

Small design details often add unnecessarily to the cost of sheet-metal products. These ideas can make substantial savings:

• **Specify** sensible tolerances. Plus or minus ½ in. is the smallest tolerance that can be maintained readily between bends on 16-gage cold-rolled sheet steel; so why call for closer tolerances unless they are necessary. A reasonable tolerance allows press-brake forming.

• **Keep** part mounting holes away from formed edges. Otherwise, they distort during forming and have to be re-punched.

• **Standardize** on flange sizes. Fewer sizes mean fewer press-brake setups.

• **Specify** standard corner notches whenever posible. Special notches require special tooling.

• **Specify** hole sizes a few thousandths or more larger than bolt or screw sizes. Keep holes to standard dimensions and in as few sizes as possible.

• **Substitute** thread-cutting machine screws for tapping.

• **Consider,** in place of a mass of material to gain strength and stiffness, the forming of light-gage sheet with corrugations, bulges, and stiffening flanges.—Mach, June 19, p1093

*Ten Steps in . . .*

# Your War Against Fire

**Fires can start in the safest plants. What General Motors has found in its search for super-safety can help your fire-prevention program**

LAST YEAR a fire destroyed General Motors Corp. Livonia plant (McG-H Digest, Mar, p45). Direct damage to plant and equipment topped $50-million; cost of lost production has been set at a minimum of $250-million more.

It was a fire that "could not happen" in a 4-year old plant where all the fire preventive measures specified by building-code authorities and underwriters were in effect. But it did happen. What GM has done since to prevent a similar disaster may guide other manufacturers, builders, code authorities, and insurance companies.

Specific steps in GM's anti-fire program look like this:

**1. Fire Walls:** At Livonia, open manufacturing area was 1,502,500 sq. ft., undivided by fire walls and without roof vents. This was a definite weakness — heat and smoke could not be localized.

Now GM proposes that no open areas will exceed 250,000 sq. ft. Where fire walls interfere with efficiency of operations, entry ways and exits will be provided. But they can be quickly closed in case of fire.

All hazardous areas will be closed off by barrier partitions and draft curtains. All vertical openings are to be enclosed with fire walls.

**2. Sprinklers:** From now on GM intends to obtain absolute sprinkler protection in all its plants. Sprinklers are to be fed from outside underground loops. A correct number of fire-hose connections with enough hose to reach any section will be located on roofs.

Wider use of spray heads is expected. Spray heads appear to be more effective where dip or quench tanks are in use.

**3. Water Supply:** All plants are to have at least two sources of water supply. Secondary sources must be capable of meeting any probable demand.

Enough yard hydrants are to be installed to permit two streams to be played on every interior part of the building that is not protected by interior standpipes. Hydrants must be in such quantity that every exterior part of each building can be reached.

**4. Hazardous Operations:** The plant physician, engineer, safety director, chemist or process engineer, fire chief, and plant protection chief are to determine the explosiveness, toxicity, and flammability of all substances received in the plant. They will instruct personnel in the storage, handling, and use of such materials.

GM has also hired an expert in safety and fire protection. He regularly visits plants and submits reports and recommendations to GM's central office and to plant managers concerned.

Where possible, very hazardous operations will be located in buildings completely separated from main plants. If not possible, such operations will be located in an area adjoining an outside wall. A fire wall with protected openings will separate the area from other manufacturing areas.

**5. Roof Decks:** At Livonia, the roof was of unprotected steel construction. The thin steel deck did not offer enough insulation between banking heat and the built-up roof covering to prevent asphalt from melting and dripping through joints of the heat-warped deck. Steel trusses collapsed quickly.

Now these guides have been set up: roof decks should be of non-metallic, non-combustible material where new-building roof decks use pitch or asphalt. Insulating materials are to be non-combustible, and all joints will be sealed to

prevent pitch from dripping in case of fire.

6. **Ventilators:** Monitors or gravity-type roof ventilators are recommended to exhaust smoke and heat. Parapets or fire stops will limit each roof area to about 100,000 sq. ft. That will help localize roof fires.

All steel structures are to be designed to carry not only dead- and live-load requirements but also must be able to support an additional load of at least 2,000 lb. at each truss panel point.

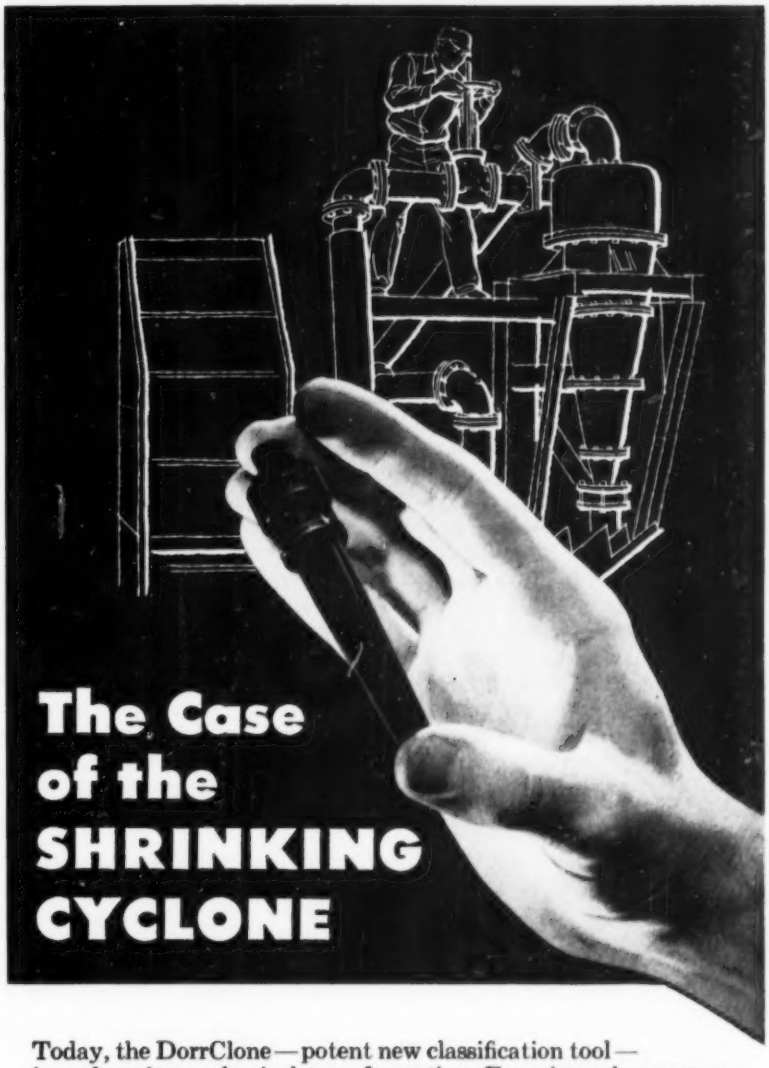
7. **Procedure Enforcement:** At Livonia, an oxy-acetylene torch was used under unsafe conditions. That is considered a procedural breakdown. GM plans no change in welding-permit procedure. It simply will attempt to administer or police more vigorously the already established procedure.

Also, the local fire department was not called until 6 min. after the fire started—another procedural breakdown. GM plans no change in fire-alarm systems because present systems are regarded satisfactory. There was no breakdown of the internal alarm system at Livonia—simply a delay on the part of employees in calling for outside help.

8. **Fire Brigades:** Tightening up of established regulations led naturally to revitalization of fire brigades. GM retrained its fire chiefs in fire-fighting methods and training techniques. It then charged them with putting new life into existing fire brigades.

9. **Fire-fighting Equipment:** GM is also improving its mobile fire carts and installing more of them in plants. GM is gradually replacing carbon tetrachloride extinguishers with non-toxic carbon dioxide or dry-chemical extinguishers. All plants located outside cities are to maintain one or more motorized, fully equipped fire trucks.

10. **Production Materials:** Perhaps one of the 'most intense phases of GM's fire-prevention program is its effort to substitute high-flash materials for low-flash materials wherever possible. Suppliers are also conducting prolonged studies to make satisfactory substitutions. — Factory, July, p100


Today, the DorrClone—potent new classification tool—is undergoing a physical transformation. Experience has proven that decreasing its diameter increases the fineness of the separation made. Result... the pencil-size TM DorrClone shown above.

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# Steam or Diesel?

**For electrical generation in small or medium-sized power plants, which type of unit should you choose? Here are six factors that will influence your decision**

ONE PROBLEM that's tough to face in building or expanding facilities of small and medium-sized power plants is that of choosing the right prime mover for electrical generation. Shall the new unit be a steam, diesel or combination plant?

**To pinpoint the problem,** we'll consider plants generating electrical energy without steam requirements for process or heating. (Maximum capacities for the purpose of this study are 16,500 kw. for steam turbines and 3,500 kw. for diesel engines.)

The answer to the problem depends on these economic factors:

**1. Fuel Costs**—This factor is so important that it alone may decide your choice. No other single cost varies over such wide ranges. It depends not only on size and characteristics of equipment but also on delivered fuel prices. For a true yard-stick, multiply station heat rate in Btu. per net kw.-hr. (as a measure of equipment performance) by delivered fuel price in cents per million Btu. The result is fuel cost on a cents-per-kw.-hr. basis.

As between steam and diesel power, the following hold generally true—(a) diesel-equipment fuel costs are not affected by unit size; (b) steam-plant fuel costs drop rapidly for the larger units; (c) diesel plants show a lower fuel cost per net kw.-hr. than even the largest steam unit when delivered fuel prices are the same.

**2. Investment**—Plant construction costs depend on many factors (foundation conditions, cooling-water supply, type of building). Given comparable conditions, small diesel generating stations will be cheaper than small steam stations, but this position will be reversed as steam stations get larger.

**3. Reserve Capacity**—If your project is an isolated plant where shutdown is not permitted, an appreciable difference in the amount of reserve capacity is required, depending on whether you choose steam or diesel.

The reason is that steam plants use fewer and larger units to attain the lower heat rates and construction costs, whereas diesel plants are smaller and more numerous. For example, if a 10,000-kw. load is to be supplied, chances are three 5,000-kw. steam units (one in reserve) giving 33⅓% standby capacity might be selected. Compare this with five 2,500-kw. diesel units (one in reserve) selected to handle the same load, giving 20% reserve capacity. In such a plant, the reserve capacity factor should bias your decision in favor of diesel.

**4. Fixed Charges**—These include depreciation, insurance, taxes, and interest or return on investment. But only depreciation has any appreciable variation with type of equipment you pick. And evidence provided by operating records shows a definite justification for lower depreciation rates when steam equipment is used. The effect of fixed charges on the relative economics of steam and diesel depends only on the investment required.

**5. Payroll Costs**—These depend on the number of men employed, prevailing wage rates, and the average work week. Chances are that a steam plant will require men of slightly higher average skill, resulting in higher wages.

**6. Other Costs**—Experience with both steam and diesels shows little if any difference in maintenance costs under the same normal operating conditions. Any slight differences that may be cited seldom affect the decision as to type of equipment selected. Cost of supplies and other expenses also indicates little to recommend one type of unit over the other.

**Miscellaneous Factors**—There are times when comparison on a dollar basis does not tell the whole story, especially when costs of the two are equal. Here are other factors you may want to consider: (1) construction time—usually shorter with diesel equipment, (2) cooling water—diesels require less, (3) fewer units—steam plants usually have fewer and larger machines, (4) reliability—about equal, (5) simplicity—favors diesel, (6) space—diesels require less, (7) starting time—diesels require much less, (8) fuel flexibility—steam units use greater variety.—Power, July, p84

## Corrugated Steel Forms Save Foundation Size

Corrugated steel forms for concrete floors can permit substantial saving in the size and cost of foundations. The lighter load also can account for lower materials-handling costs.

**One job,** on which the forms were used, consisted of 20 floors, each 125x125 ft. A crew of six ironworkers and two carpenters installed the forms in 1½ days.

The forms, made by Granco Steel Products Co., Granite City, Ill., are deep-corrugated units with transverse temperature wires welded across the corrugations. In addition, ⅜-in. reinforcing steel bars were placed before the concrete was poured. The forms weigh 2 lb. per sq. ft. and were fastened to welded studs and to the steel framework.—Const Main & Equip, June, p164

## Ultrasonics Drill Well

Sound-powered oil-well drill, developed by Borg-Warner Corp., has reached true field-testing stage. Months of testing with artificial formations—concrete plugs poured in a 10,000-ft. well—showed high penetration rates. In one test, with igneous rock mixed with the concrete, the bit advanced at 400 ft. per hr.

**The mud stream** drives a subsurface turbine, which in turn powers a sound generator. Sonic conditions set up by the generator impart a percussion motion of less than 2 in. to the bit. The drill pipe is rotated at slow speeds by a conventional rotary table.—Oil & Gas J, June 7, p62

## New Foundry Emphasizes Handling, Cleanliness

The new foundry at Fairbanks, Morse & Co.'s Kansas City, Kansas, plant can produce 80 tons of gray iron, stainless steel, and bronze castings a day. The foundry emphasizes cleanliness and mechanized handling. These are some of its features:

- **Air** within the building is changed every 3 min.
- **All fume areas** are hooded to collect and carry off contaminated air. Even conveyor lines that carry castings from pouring through cooling are hooded.
- **Shakeouts,** where castings and sand are separated, are hooded.
- **Water curtains** collect cinders at tops of cupolas.
- **Sand mixes** for core making are delivered to a station by an enclosed system.
- **Molds** are conveyed from the point of preparation through pouring and cooling to shakeout.
- **Other conveyors** pick up castings from shakeouts, carry them to cleaning.
- **Underfloor conveyors** collect excess sand from mold preparation and return it to screening and mixing.—Factory, July, p76

## Good Incentive Plan Should Include Everyone

The basic requirement of a good incentive plan is incentives for everyone. So says George & Dix Co., management consultants. Accurate measure of performance is the key to success of an incentive plan.

Responsibility patterns provide the basis for measuring performance, as the following premises declare:

1. **Those who formulate** the policy should share in the profits.
2. **Those who sell** should earn more as their sales volume increases.
3. **Those who supervise** should be compensated for their control and reduction of costs.
4. **Those who produce** should be rewarded for their production.
5. **Those who serve** should be paid in relation to their services.

—Am Business, June, p46


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Analysis
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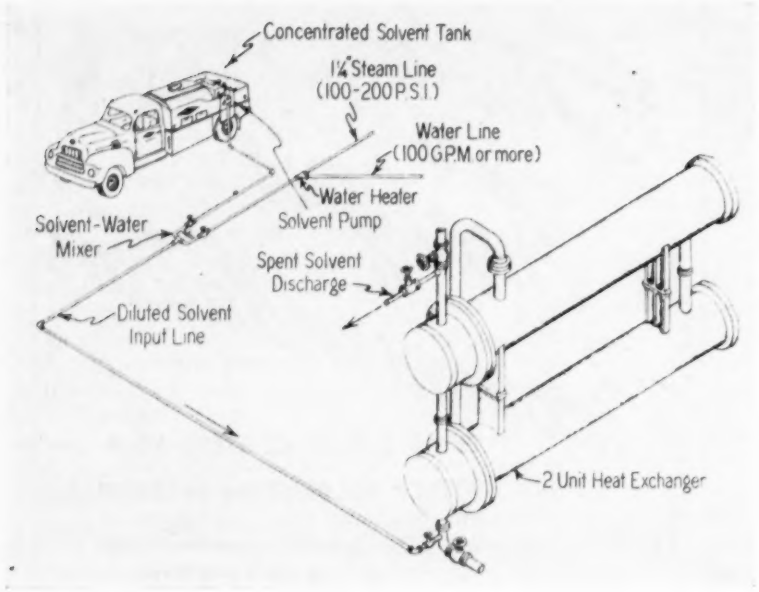
### *This Is a Typical Cleaning Hookup . . .*




### *. . . for Such Jobs As*

- **Beer pasteurizers**
- **Blood plasma condensers**
- **Boilers**
- **Copper tubing**
- **$CO_2$ absorber, reactivator**
- **Dowtherm boilers**
- **Filter beds**
- **Fuel-oil heaters**
- **Heat exchangers**
- **High-pressure ammonia condensers**
- **Liver-extract condensers**
- **Rice cookers**
- **Rotary vacuum filters**
- **Salt evaporator pans**
- **Soybean extraction condensers**
- **Water lines**
- **Water wells**
- **Steam-heating coils in large open-type cookers (outside or process-side surface)**

# Chemical Cleaning Uses Grow

**Does your plant equipment need internal cleaning? If so, chemical solvents may be the answer. Here is how they help food processors — in ways that are applicable to practically every major industry**

CHEMICAL CLEANING has been recognized as an effective maintenance tool for many years. But only recently was its application broadened to include virtually all major industries.

This expansion has been due largely to efforts of service companies in developing new chemical solvents, more efficient mobile pumping equipment, and improved cleaning procedures. Concerted efforts of laboratory research chemists and field engineers brought answers to many stubborn cleaning problems.

**The basic principle** is the use of liquid solvents to remove all kinds of deposits from plant equipment —deposits that otherwise may reduce operating capacity, impede heat transfer and, in some cases, even result in contamination of products being processed.

Removal of deposits is usually accomplished by utilizing both the chemical and mechanical cleaning action of the solvents. The unwanted matter is either dissolved or disintegrated, then flushed away.

**Several unique advantages** are possessed by chemical cleaning over manual or mechanical cleaning methods. The chief ones are:

1. **Dismantling** is held to a minimum. Solvents are pumped into the equipment through regular connections. They will travel wherever steam or water flows, reaching the most complicated surfaces—angles, curves, and inaccessible areas. As a result, cleaning procedure is greatly speeded, requiring a matter of hours rather than days.

2. **Periodic** maintenance cleaning programs may be set up. When plant equipment must be dismantled and cleaned manually, it is natural to postpone the job as long as possible, even though inefficient operation is costly. The ease of chemical cleaning makes it possible to conduct such operations at regular intervals, and thus keep the unit at high-average performance at all times.

Cost per unit depends upon the number of units that can be cleaned simultaneously by the same crew and also on amount and type of deposit present. In preparation costs, chemical cleaning offers a distinct advantage by eliminating the need for building scaffolds and disassembling equipment.

Another big item is the saving of downtime when this means lowering production schedules. In some cases, this saving alone will offset cost of the treatment.

**Choice of cleaning method** depends on the following factors:

(a) chemical composition and physical characteristics of deposit; (b) size, volume, and design of equipment to be cleaned; (c) materials of construction and precautions necessary to protect unit; (d) possibility of hazardous chemical reactions between solvent and deposit; (e) in the case of food products, the use, when necessary, of chemicals that are non-toxic and will not impart an after-taste.

When acid solvents are used, it is essential to add an inhibitor to protect metal being cleaned. These are chemicals that have the unique quality of selectively preventing dissolving action of acid on metal without materially affecting reaction between acid and deposit.

This is an electrochemical phenomenon, with the inhibitor plating out in a monomolecular layer over the metal's surface. Under normal conditions, more than 99% protection is supplied. Usually a solvent temperature in the range of 150° to 175° F. is maintained. If treated metals have greater susceptibility to acid attack, temperature is lowered—usually to 120° F. maximum.

**Actual mechanics** are relatively simple. Once deposit sample has been identified and treating methods have been selected, solvents are put to work by means of a pump-truck hookup.

In the typical hookup shown—for cleaning a heat exchanger—the truck is equipped with a 1,000-gal. chemical tank and centrifugal pump. Concentrated acid solvent is pumped through a proportioning mixer, in which it is diluted with heated water, and then pumped to the heat exchanger. Solvent generally is allowed to soak about 5 or 6 hr.

Here are some chemical-cleaning case histories in the food industry:

**1. Piping System**—In fabricating new ½- and 2-in. copper tubing, all joints were made by sweating. Coppersmiths had permitted soldering paste, composed essentially of powdered rosin, intimately mixed with a solid mineral oil, to fall into line. Cleaning procedure consisted of circulating a hot (175°F.) dilute alkaline solution, containing a wetting agent, through the lines for 3½ hr. at a rate of about 10 gal. per min. Lines were then rinsed with hot water and found to be clean.

**2. Fuel-oil Heaters**—Two units in a sugar mill had developed considerable sludge on the oil side. This impeded heat transfer and increased pressure drop. Hot hydrocarbon solvent was circulated through the heaters for 1 hr., followed for 3 hr. by a hot dilute alkaline solution containing an emulsifier and a wetting agent. The alkaline solution then was displaced by air pressure. Results were extremely good. Pressure drop was reduced from 60 to 30 lb. per sq. in. A 40°F. temperature increase was made possible.

**3. Water-well Stimulation**—In a plant manufacturing soaps and vegetable-oil shortening, the water well had decreased in production until it would go dry in less than 1 min. of pumping. Following acidizing treatment, the well produced 504 gal. per min. with 10-ft. draw-down.

**4. Steam Supply**—A plant making intravenous foods had to clean a boiler that furnished live steam directly to processing. The operator was concerned about chemical cleaning for fear of toxic residues and odors. But the boiler was cleaned safely and effectively with hydrochloric acid containing a non-toxic inhibitor. The operation required about 12 hr.—Food Eng, July, p57

## Spad Hangers Save Time

What to do with trailing cables, water lines, and compressed-air lines presents a problem in mines where extensive use of roof bolting is made. There is just no place to hang them without doing a lot of extra work.

Pittsburgh Coal Co.'s Montour 4 mine solved the problem by driving spads into the roof. Cables and lines are hung from spads.

**Spads are driven** on 4-ft. centers where needed with a hand-operated tool. Hangers are threaded through holes in the spads and can be removed for later use as the mine advances or retreats. The 5-lb. tool, spads, and hangers were supplied by the American Mine Supply Co.—Coal Age, June, p87

# Scotland Lures IBM

### . . . by building it a plant for nominal rental and by offering plenty of labor, space, transport

WHEN International Business Machines decided to manufacture in Britain and started (in 1948) looking for a major site, Scottish officials offered to build a plant to IBM specifications and rent it at a quarter of normal rates—with a 20-year option to buy. South Wales and Manchester offered the same.

The American company, through its British subsidiary, IBM United Kingdon Ltd., picked a Scottish site—at Inverkip, 20 miles down the River Clyde from Glasgow. The area offered skilled, plentiful and inexpensive labor, plus plenty of space, power, and transport—all cheap. This month, IBM-UK moved into its new plant.

**The deal worked out** as follows: The company bought 130 acres of farmland near Greenock. Then Scottish Industrial Estates, a privately-run arm of the British Board of Trade and sponsor of the project, started building a $560,000 120,000-sq. ft. plant on 12 acres bought from the company. By the time it was finished, IBM-UK had added and paid for $140,000 of extras. SIE will now rent its part of the plant to IBM-UK.

Production at the new plant will include electric typewriters and six to eight completely automatic accounting systems. From an initial 500, the work force is expected to swell to 625 by year-end and over 800 next year.

**Expansion plans** include installation of $200,000 of new tooling already ordered plus the expenditure of another $280,000 within a year. IBM people admit they are ambitious but point to a year's backlog of orders and an export average of $100,000 monthly—the outgrowth of small-scale operations begun in London 6 years ago.

For SIE and its partner, the Scottish Council, the project is part of a $100-million program of factory construction in Scotland. —Business Wk, July 17, p120

## New Process Recovers Beryllium, Other Metals

A new process for recovering beryllium and other metals from ore has been developed and patented by engineers of Light Metals Refining Corp., New York. It represents a new approach to metal refining.

**In the new process,** the material to be treated is incorporated as raw ore into rod-shaped electrodes containing about 30% soft coal. These rods are baked and then consumed continuously in an arc furnace by means of a high-intensity arc. The arc causes the material of the rods to vaporize rapidly from the ends. Temperature is estimated at from 15,000° to 20,000°F.

The ore is completely broken down into its elements. Chlorine gas is fed into the furnace and mingles with the vaporized elements, converting the metallic components of the ore into their chlorides. The chloride vapors are then piped to a series of condensing chambers, in which each of the different chlorides is successively condensed out in pure form. Beryllium chloride is then broken down into beryllium and chlorine by electrolysis. Chlorine is re-used in the process.

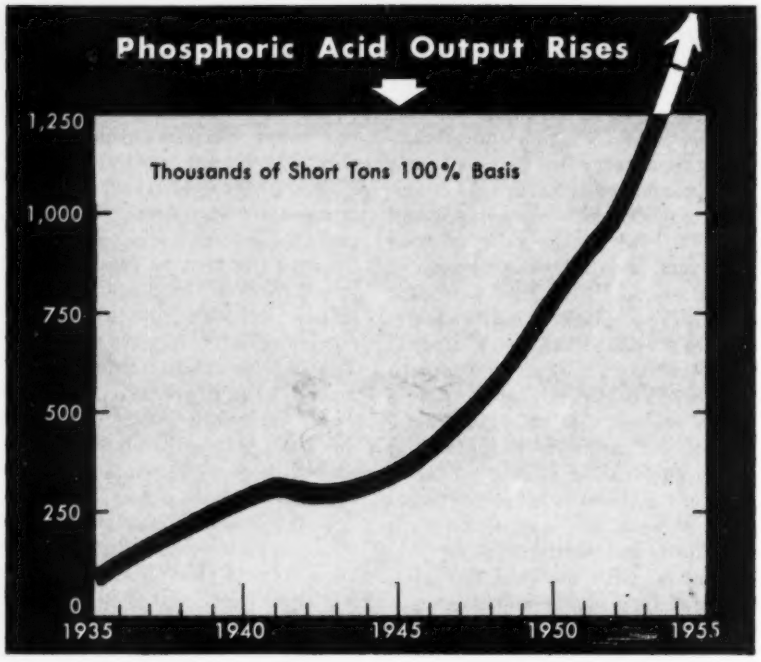
**Price per pound** of beryllium by the new process would be about $15 compared with $90 for other methods of recovery. Purity would be 99.6%, compared with 98.5%.—E&MJ Met & Min Mark, June 3, p8

## Flare Eliminates Smoke

Atmosphere pollution is becoming a troublesome problem wherever an industrial area springs up. Refineries are no exception.

**So Standard Oil of N. J.** developed a smokeless flare to burn waste refinery gases. It consists of three concentric masonry stacks. The outer stack is 14 ft. ID and 30 ft. high; the intermediate, 6x12 ft; the inner, 2½x4 ft.

A water spray in the inner stack mixes water with the gas. The mixture is ignited at the top of the inner stack. Conversion of the water to steam eliminates smoke.—Pet Proc, June, p876




# Boom in Phosphates

**New uses in detergents, animal food, gasoline, and plastics have helped boost phosphoric acid output. But fertilizers are still the biggest outlet**

THE U. S. PHOSPHATE chemicals industry is booming. Output of its basic product—phosphoric acid—is soaring to above the 1-million ton mark (chart, above). Just now the industry is completing its latest expansion—a 3-year program costing $90-million.

**Phosphate producers** have fostered the boom in two ways:

1. By improving the qualities of older materials.

2. By making it possible to bring entirely new products to the market. These include detergents, water conditioners, animal-food supplements, drugs and toothpastes, gasoline additives (TCP), hydraulic fluids, insecticides, plastics, flame retardants, and fertilizers.

Here are some leading examples of new uses for phosphates:

**Gasoline Additives**—Shell Oil Co. has boosted sales with a gasoline that contains tricresyl phosphate (TCP). American TCP Corp. is marketing a canned TCP concentrate that car owners add to their fuel (and Shell has gone to court to protest this use of the TCP name).

**Animal Feed Supplements**—International Minerals and Chemicals, among other fertilizer producers, has marketed dicalcium phosphate, which is added to poultry and other feed to spur growth and improve health.

**Plasticizers**—Mixed with plastic resins, phosphates improve resistance to fire, flexibility at low temperatures, and responsiveness to processing in final production operations.

**Detergents**—A phosphate called sodium tripoly was a keystone of the detergent business that sprouted after World War II. Detergents still take 85% of sodium tripoly output, but demand is leveling off.

The industry's most important customers, however, are still the makers of fertilizers, who are rapidly expanding production ca-

pacity. For instance, output capacity of normal and triple superphosphates is scheduled to jump 4-million tons by 1960.

**These are big sellers** in the billion-dollar fertilizer market. Along with other fertilizers—potash and nitrogen—they have helped increase productivity of U.S. farms, which have raised yields 30% since 1939 without increasing acreage.

The industry is pushing research on new by-products of phosphate rock—its raw material, which contains traces of uranium, vanadium, and fluorine.

**A uranium recovery unit** has been installed at Bonnie, Florida, by International Minerals and Chemicals as part of its new $10-million phosphate plant.—Business Wk, June 26, p70

## New Electronic Tubes Feature Stack Design

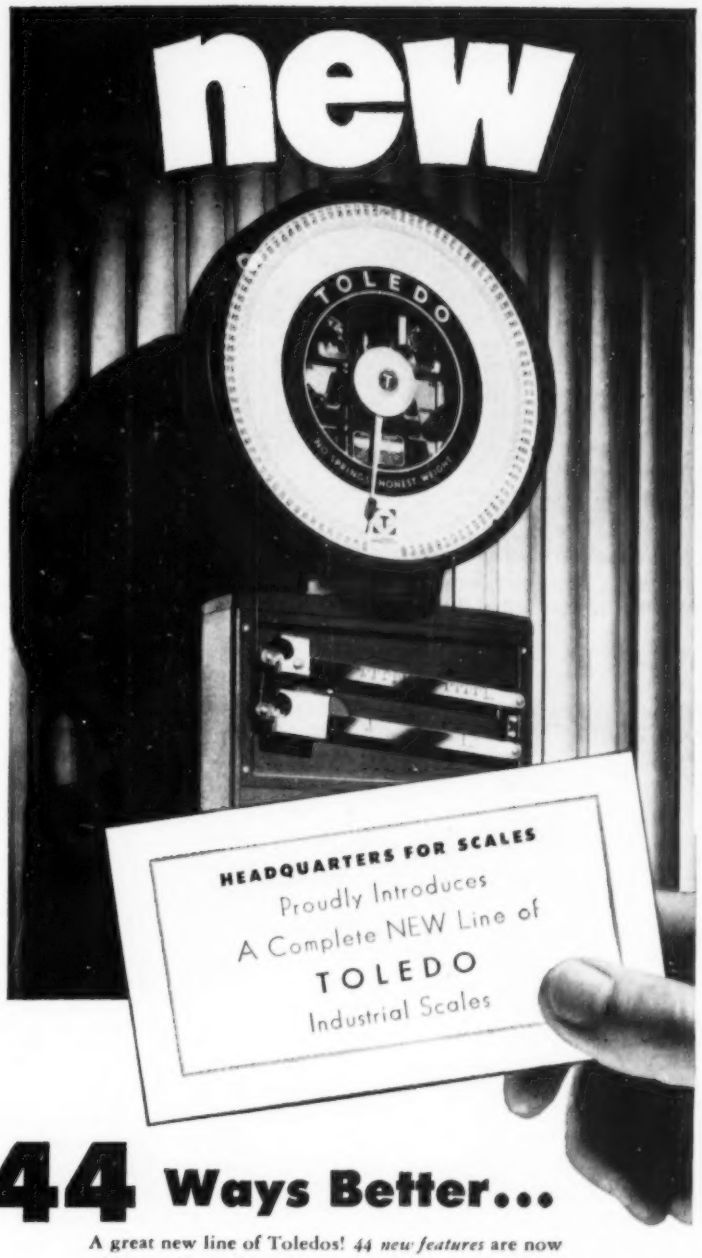
A new and radically different type of electron-tube construction, using stacked metal and ceramic elements, has been developed. It permits fully mechanized assembly; improves receiving-tube uniformity, performance, and reliability; and raises operating ambient temperature to from 300° to 400°C.

The new-type tube has been developed by two manufacturers:

• **Sylvania Electric Products, Inc.** stacks its tube as follows: Each element is assembled on a pair of vertical pins. First, the plate element is dropped into place, then a ceramic spacer, then a grid, another spacer, etc. Then the pins are electrically riveted to hold the assembly in place.

Resulting tube is crowned with a squat ceramic cap, giving it a pill-box appearance. Company believes it will function where ordinary vacuum tubes or transistors would not stand up.

• **Eitel-McCullough Inc.** has designed an all-ceramic twin triode of similar pill-box appearance. Tube uses flexible leads instead of the familiar plug-in base. Company expects it to be so reliable that it can be soldered into a circuit like a resistor or capacitor.—Aviation Wk, June 28, p61; Business Wk, July 3, p52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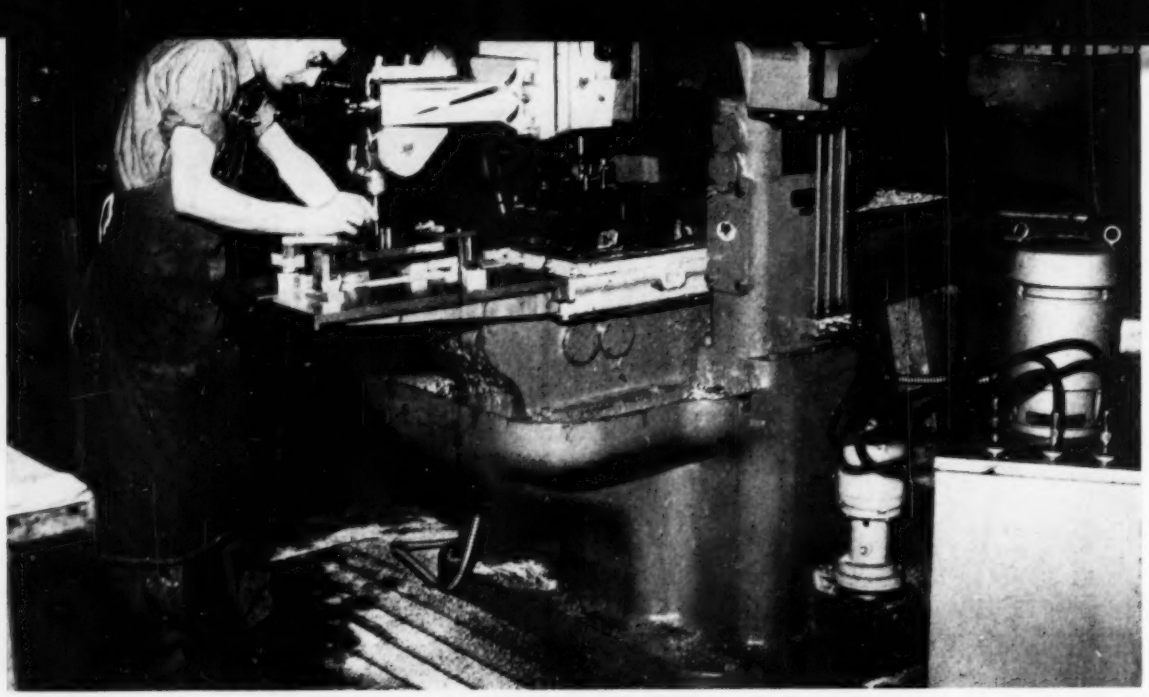


**ALUMINUM-ALLOY FITTING is profiled in 11 min., instead of former 72 min. Profiler is fitted with True-Trace hydraulic tracing valve. Operator follows templet with valve stylus to control table and head movement.**

# Production Ideas for Your Plant

**From aircraft plants in the U.S., production ideas are flowing into other plants. Here reviewed are some outstanding methods that have appeared**

MANUFACTURE of modern, high-speed airplanes has demanded the creation of new machining and other production processes and the refinement of older methods. Many of the developments stemming from American aircraft plants are finding their way into other industries.

**The research** on high-speed milling, carried on for the U. S. Air Force by Consolidated Vultee Aircraft Corp., points the way. The test machine was a Cincinnati 18x48-in. vertical mill with speeds to 10,700 rpm. at 50 hp. and table feeds to 375 ipm. (in. per min.).

Tests indicated that average finishes of 10 to 20 mu in. rms. could be obtained on aluminum alloy 75ST at feeds of 175 to 250 ipm. Longer tool life also was possible; warpage problems were eliminated.

Cutters had to be modified. Face mills were made with one inserted carbide tooth per inch of diameter. Teeth were given 30° axial rake, 20° radial rake, 10° clearance angles with land, and $\frac{1}{64}$-in. by 45° chamfer.

**Biggest boost** given to machining speeds has been helical carbide cutters. The helical design was common in high-speed-steel cutters but was abandoned with the change to carbide tips. But Boeing Aircraft Co. found that carbide inserts could be twisted successfully by placing one end in a vice, heating to 2200°F. with a torch, and twisting with pliers.

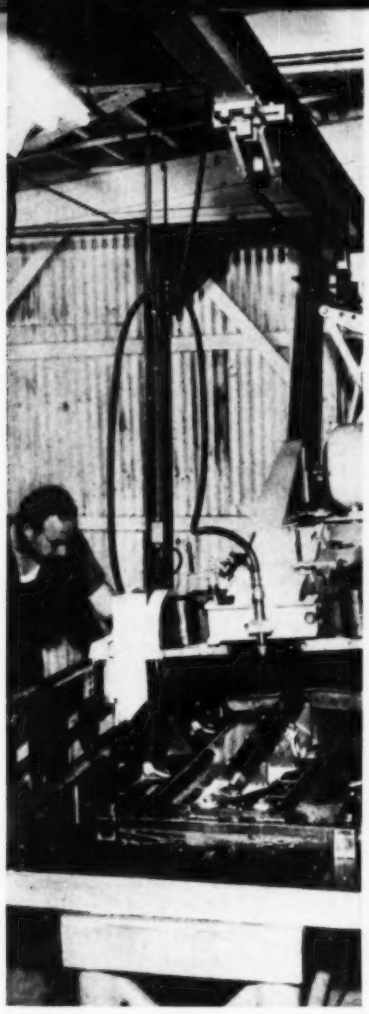
One Boeing wing stiffener, 76 ft. long, requires a cut $1\frac{1}{2}$ in. wide and from $\frac{1}{8}$ to $\frac{1}{4}$ in. deep. With a helical high-speed-steel mill, two cuts were required at 50 ipm.; time was 45 min. Changing to a straight carbide cutter raised feed to 80 ipm., cut the time to 20 min. A helical carbide cutter now does the job in one pass in 7 min.

**Double curvature parts** can be difficult to reproduce accurately. For large parts, one trend is to produce them on machines that, in the past, have been used primarily for making dies. One subcontractor will soon have 28 Pratt & Whitney Keller machines operating on parts for a single plane.

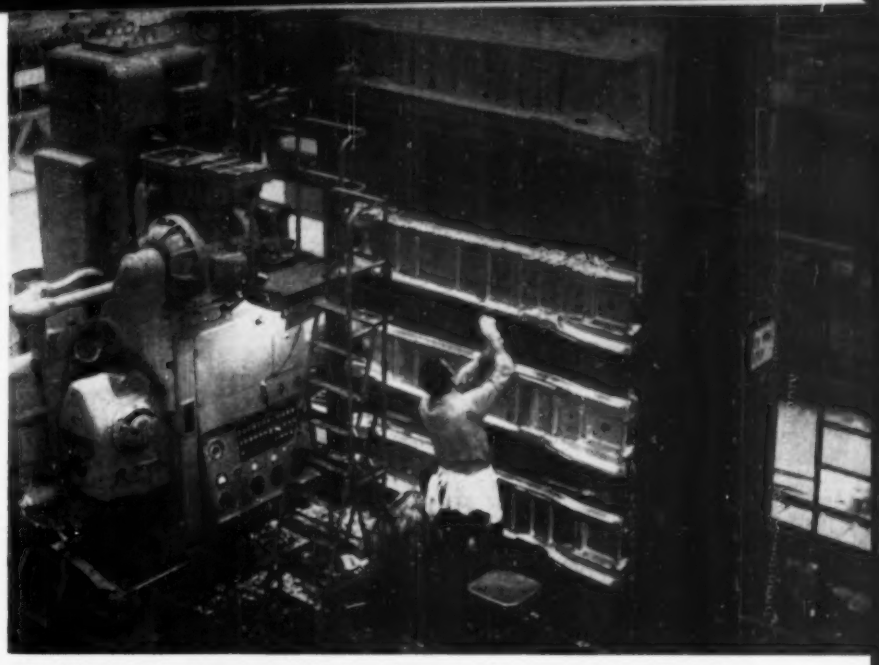
Rohr Aircraft Co. has rebuilt a Fox belt grinder to grind compound curvature on torque bulkheads. Two sets of cams are installed on the table. The shaft of the pressure wheel, as it traverses the table, rides on the cams and twists to follow the contour. The abrasive belt is flexible enough to absorb the twist between drive and pressure wheels.

**Several developments** have advanced the rubber forming process. A recent one has been to increase the pressure. At Northrop Aircraft, Inc., the size of the rubber-pad container has been reduced to increase working pressure from 1,800 to 7,000 lb. per sq. in.; the increase has eliminated about 40% of the hand work formerly needed to remove wrinkles.

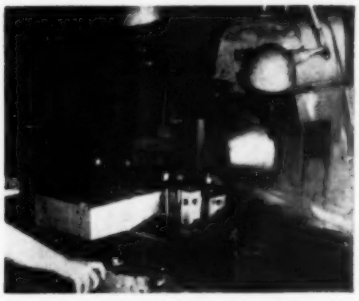
Another step has been the



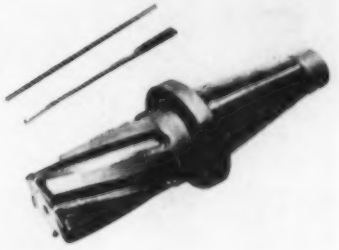
WET-BELT GRINDER, cam controlled, grinds compound curvature.



KELLER MACHINE contour-mills three large forgings at one time. Part sizes are increasing so that only a section of some parts can be machined at a time.



CONICAL CUTTER, with helical carbide blades, operates at 1,250 rpm.



CARBIDE INSERTS for helical cutter are heated and twisted.

"over-press" technique. A heavy-gage steel part is formed over the form block with a finished wrinkle-free piece in place. The steel over-press, held in position on the form block and blank by locating pins, serves as a female die. Its use virtually eliminates wrinkles.

**Impact rubber forming** is being adapted on drop hammers. At Consolidated Vultee, a Cecostamp is equipped with an 18-in.-dia. base and matching rubber container.

Form blocks are made of aluminum alloy 17S. They are thick enough to keep the bottom of the formed part up at least one inch from the base because the impact will not extend down the side of the block to the base.

Stretch forming continues as the favored method for skins without integral stiffening. North American Aviation, Inc., has developed a prestressed hot-forming process. The sheet is clamped between dies and heated in an oven to a temperature high enough to lower the yield point and cause permanent set.

**Plastics are becoming** a major item in both tooling and production parts. Boeing and Northrop are making extensive use of mat molding, which is replacing the familiar method of making plastic parts by laminating glass cloth with a thermosetting resin.

Spun, drawn, and treated glass fibers are collected in a "rope" of about 200 filaments. Fibers are cut in 1- to 3-in. lengths, deposited on a conveyor at random, and sprayed with a binder. The mat is fitted into the female die of a set, resin is added, and the plastic is cured at 200°F. in the closed dies.

**Forging developments** include a process that closely resembles impact extrusion. Parts are forged in a hydraulic press without impact. McDonnell Aircraft Corp. and Prex Forging Corp. have pioneered in this field. Production parts, called "pressings," are made in 14S and 75S alloys in areas to 6x10 in. and walls 0.1 in. thick.

The entire part is entirely formed in the lower die, which is likely to be a ring die fitted into a retaining ring and clamped to a bottom plate. The upper die, actually a punch, may have a shaped shoulder to serve as a complete closure for the dies. Forging pressures are high.

**Forged parts** have a smooth appearance with finishes about 70 mu in. rms. Material saving and machining are considerable; one McDonnell part weighing 19.4 lb. is now made from a 20.1-lb. pressing instead of the former 150.5-lb. forging.—Am Mach, July 5, p129

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## Air Conveys Hot Dust With Little Loss of Heat

Dust recovered by Cottrell precipitators in the roasting of metallic sulfides at Noranda Smelta, Quebec, Canada, is returned to the roasting furnaces at temperatures from 500° to 800°F. by a special pneumatic conveyor.

**The dust** from the Cottrells is gravity fed into a Fuller-Kinyon pump. A screw element of the pump feeds the dust into an air-mixing chamber in which it is made fluent by compressed air. From the mixing chamber, compressed air delivers the dust through a conveying line to a supply bin above the roasters. Dust is fed uniformly from the supply bin to the roasters by means of a Fuller-Huron Airslide.

**The Airslide chute** is made of a horizontal, enclosed, porous medium separating an air chute on the bottom from the stream of dust on top. Low-pressure air, passing through the porous medium, fluidizes the dust sufficiently so that gravity causes it to flow. The porous medium is refractory aluminum oxide.—Eng & Min J, July, p91

## New Surfacing Material

An entirely new kind of metal-surface cladding can be applied at room temperatures. Not only does it give to the base a hardness and abrasion-resistance almost equal to metallic tungsten, but it is self-lubricating as well.

**Called Tungstide,** it is made by Lockrey Co., Southampton, N. Y. The material is reported to be a suspension of particles of tungsten of near-colloidal particle size in an unnamed plastic.

The company claims that Tungstide is now being tested in such applications as reducing the wear and extending the life of relay-latching members in electronic computers; for surface-hardening and preventing dimensional losses by stylus-wear on cast phenolic masters in duplicating machines; and in applications where a case-hardening effect is desired on brass, plastics, and other softer materials.—Mod Plastics, July, p188

# TECHNICAL SHORTS

**Free-Machining Tool Steel**—Some plants are holding up buying certain types of tool steels until the steel industry decides about the value of sulfur in tool steels. Latrobe Steel Co. reports its field tests of tungsten-molybdenum high-speed steel with 0.1% sulfur showed easier machining, longer tool life.—Am Mach, June 7, p175

**Gypsum Saves Materials**—U. S. Gypsum Association says a typical three-story, office-store type building, using a light steel frame fireprotected with gypsum, showed savings of $5 per sq. ft. over heavy steel fireproofed with concrete, and $2.50 over reinforced-concrete frame. A ⅜-in. perforated gypsum lath covered with lightweight gypsum plaster protects beams and columns.—Am Builder, July, p174

**Two-way Radio**—Twenty-three lumber and logging companies in Oregon operate a cooperative radio station that keeps in touch with their cars, trucks, and camps, each of which has a transmitter-receiver. System, besides speeding up operations, aids in many public services—during forest fires and other emergencies.—Paper Ind, June, p298

**New in Fibers**—Rilson, a new synthetic fiber belonging to the family of polyamides and made from vegetable materials, has been developed by Snia Viscosa, Italy, and has successfully passed tests. Celanese Corp. of America has developed a method of combining yarns of contrasting colors and deniers to obtain random color effects.—Textile World, June, p256

**Blast-air Moisture** — Muskegon Piston Ring Co. improved its cast iron by controlling moisture content in cupola air blast. Lithium choride solution holds moisture at 3 gr. per cu. ft. of air. Holding moisture constant helps produce iron of uniform quality.—Iron Age, July 1, p112

## Photo Typesetter Uses Electronic Flash Lamp

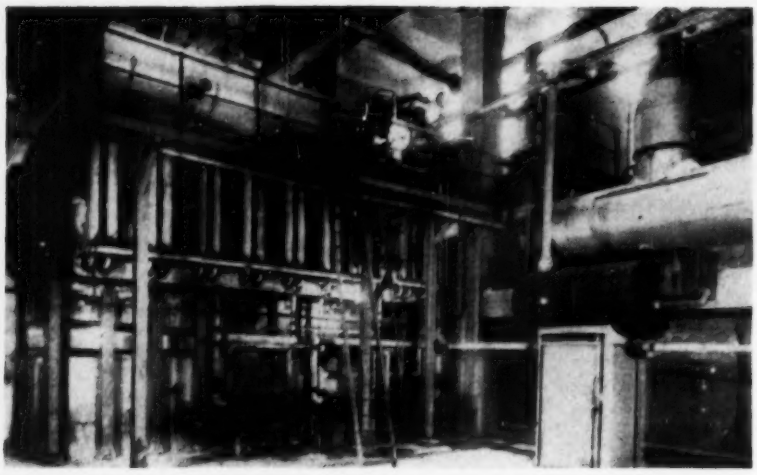
**This photographic typesetter, recently demonstrated in a preproduction model by the Mergenthaler Linotype Co., uses a modified electric typewriter to provide a punched paper tape containing letter and spacing information. When tape is run through the photographic unit (right), the punched information automatically sets shutters to uncover the proper letter on one of five negative plates. An electronically triggered flash lamp prints the letter by projection on film. —Electronics, June, p14**

**Chemical Mills Metal**—Precision milling of metal by a new chemical process has been announced by North American Aviation, Inc. Metal to be removed is left exposed through special masking compound. Etching solution attacks exposed metal at an even rate until correct amount of metal is removed. Process is electronically controlled. Accuracy is within 0.002 in.—E&MJ Met & Min Mark, June 17, p7

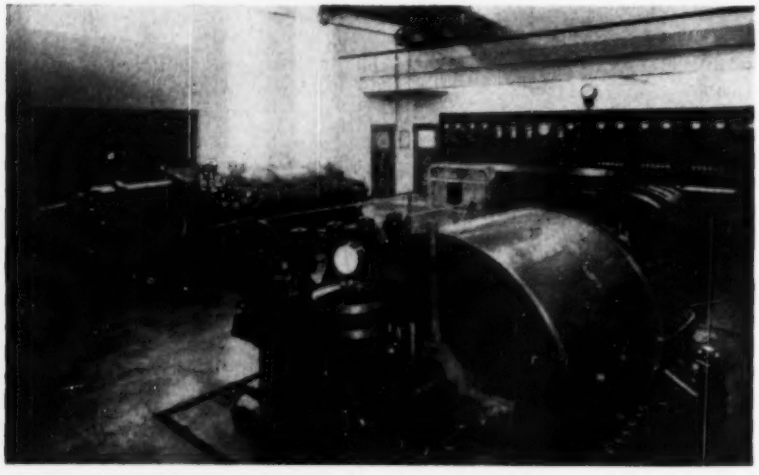
**Pilotless Helicopter**—A pilotless, tethered, electrically powered helicopter soon will be tested by the U. S. Army Signal Corps. It would function as an aerial platform for a television camera to increase visual range of ground troops. Altoscan Co. of Sharon Hill, Pa., has built an experimental model. Projected prototype could carry 250 lb. of useful load.—Aviation Wk, July 12, p37

**Giant Spar-and-skin Mill**—World's largest combination spar-and-skin milling machine, 90 ft. long by 30 ft. wide and 26 ft. high, has gone into operation at Douglas Aircraft Co. in California. Built by Giddings and Lewis Machine Tool Co., the machine weighs 250 tons and can handle thick aluminum plate 40 ft. long by 10 ft. wide.—Auto Ind, June 15, p41

**Gyrobus**—Revolutionary Oerlikon Gyrobus operating in Yverden, Switzerland, is powered by a 3-phase squirrel-cage motor energized by a flywheel set built into the chassis and rotating horizontally. An electric motor built onto flywheel accelerates it up to 3,000 rpm. Flywheel recharging is done at route stations (costing about $500 each) and takes from ½ to 3 min. Each charge enables bus to run about 6 kilometers.—Bus Transportation, July, p52



**SULFUR-BEARING GASES cooled in waste-heat boilers yield . . .**



**POWER for smelter operation in these turbine generators.**

# Smelter Yields Sulfur

## High sulfur content of copper-bearing ore lets this Norwegian smelter obtain valuable sulfur as a by-product of copper-refining process

ELEMENTAL SULFUR is produced as a by-product from copper-bearing pyrites at the metallurgical plant of Orkla Grube-Aktiebolag, Lokken, Norway. Sulfur content of the ore is 41%.

**The process** operates as follows: lump pyrite is mixed with coke and the fluxing agents, silica and limestone. This charge is smelted in water-jacketed furnaces.

Part of the contained sulfur is distilled off in the upper part of the furnace, while FeS is oxidized to form FeO and $SO_2$ in the smelting zone of the furnace. The $SO_2$ in the smelting zone is reduced to sulfur and $CO_2$ in the furnace shaft with the aid of coke.

**FeO reacts** with the silica and limestone to form a slag containing approximately 80% $2(FeO) \cdot SiO_2$ and about 15% $CaO \cdot FeO \cdot 2(SiO_2)$. The copper plus some of the FeS forms a matte running about 12% copper. This slag-matte melt is separated in forehearths. The slag contains about 42% iron, mainly as silicates.

Gases leaving the top of the furnace contain about 300 g. sulfur per cu. m., plus $CO_2$ and various sulfur compounds. These gases are cleaned in dust flues and then passed through a catalyzer that promotes the following reactions:

$$SO_2 + 2H_2S \rightarrow 2H_2O + 3S$$
$$CS_2 + SO_2 \rightarrow CO_2 + 3S$$
$$2COS + SO_2 \rightarrow 2CO_2 + 3S$$

**Gases leaving** the catalyzer are cooled from 450° to 130°C. in waste-heat boilers. Most of the sulfur is condensed in the boilers. Then the gases are washed by the injection of liquid sulfur in scrubbers, reheated in heat exchangers to about 300°C., and passed through a second catalyzer.

Sulfur formed in the second catalyzer is precipitated in cooling towers and scrubbed with liquid sulfur. $SO_2$ contained in the tail gases is absorbed in towers filled with limestone, and sprayed with sea water to prevent damage to surrounding vegetation. In a final step the sulfur is washed with milk of lime to remove arsenic, and then granulated or molded.

**Matte produced** in the furnace is upgraded to about 40% copper by resmelting with coke, silica, and limestone. Conventional converters and electrolytic circuits produce refined copper. In the over-all process, copper recovery is about 84 to 85% and sulfur, about 85 to 86%.—Eng & Min J, July, p88

## New Thread Compound

A silicone thread compound for high-pressure service has been field-tested successfully, the American Petroleum Institute reports. Mellon Institute developed the compound for API.

**Its purpose** is to provide tightness in threaded pipe joints under high pressure. Development originally was undertaken to get a suitable thread compound for oil-well tubular goods engaged in deep drilling.

**Results** of field tests showed good adherence to threads, no thread galling, no trouble in running casings, good durability, and no leakage after 2 years of service. —Oil & Gas J, July 12, p99

SPECIAL

# Sunday Dispatch

This solution may help you

# FAMOUS PAPER TAKES THE WORK FROM PAPERWORK

LONDON, August 23.—So great were sales of London's *Sunday Dispatch*, one of the world's biggest selling weeklies, their paperwork couldn't keep pace with their paper! Statements to agents had to get out *Monday*, 24 short hours after the *Dispatch* hit the stands. As circulation increased, their old hand-written system of accounting made this goal virtually impossible, and threw a heavy burden on the office staff.

To solve their problem, Associated Newspapers Limited, publishers of the *Sunday Dispatch*, enlisted the help of their Burroughs man.

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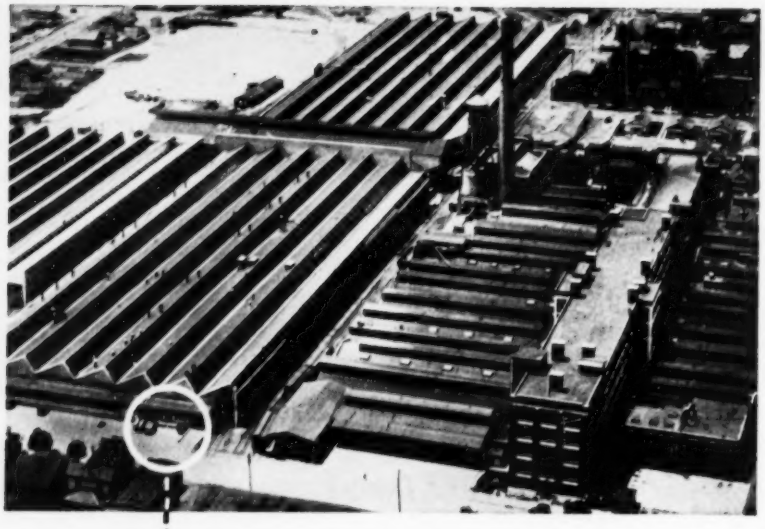

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## Aluminum Panels Speed Building Enclosure

Prefabrication, shrewd advance planning, painstaking make-ready, and adequate skilled labor lay behind the successful enclosure of two sides of a 22-story office building in New York City in less than 10 hr. Prefabricated aluminum panels account for the speed.

**The panels,** complete with window frames, are factory-made. Weighing 200 lb. apiece, they are 4½ ft. wide and 23 ft. high, enabling two stories to be enclosed at one time. Each panel contains two reversible, vertically pivoted 6-ft. high windows, designed to rotate to permit cleaning from inside the building. Each panel has an integral flange that interlocks with adjoining panel flanges, eliminating need for calking.

**All panels** are surfaced with 5% silicon-aluminum alloy on the outside. On the inner side, asphalt coating was applied in the factory to the spandrel portion in order to absorb sound. Behind the aluminum panels will be a 4-in. block backup and insulation.

A crew of 40 men handled the job. Panels were fabricated and installed by General Bronze Corp. —Eng News-Rec, July 1, p23

## New Pallets Cut Costs

Ternstedt Div., General Motors Corp., has a new type of unit-load platform that simplifies shipping procedures and saves money. It is called a no-block pallet.

**The new pallet** is minus the nine 3x4-in. blocks found on the conventional pallet and has instead eight 1-in. full lumber strips extending the full length and width of the pallet. Trucks with chisel or sabre-pointed forks can pick them up easily.

**Savings** come from the reduction in the cost of each pallet. Shipping costs have also been cut because the no-block pallets weigh less and take up less space. Warehouse stacking space for unloaded pallets is saved. Impressive savings have shown up in tiering pallet load upon pallet load. Because of their low cost, pallets are expendable.—Mod Packaging, June, p142

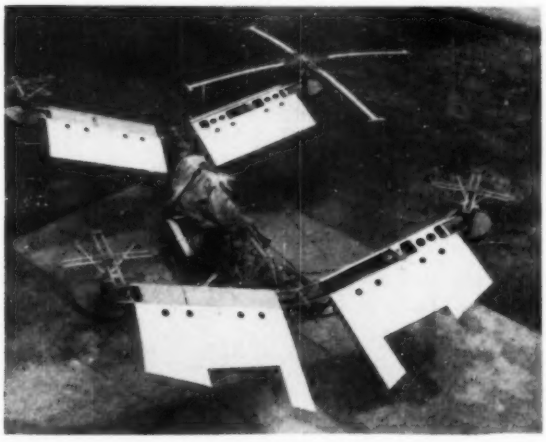
# Progress in Helicopters

HELICOPTERS are breaking new frontiers every day, both in civil and military aviation. Some of the latest advances are illustrated on this page. In the U. S., scheduled air-freight express, already in operation on the West Coast, has been brought to the East by Mohawk Airlines. Passenger services operate in New York and Miami. And much bigger helicopters, such as Bell Aircraft's 40-passenger model, are projected. In Britain, helicopters received a big boost when the government lowered minimum ceilings over much of London to 500 ft.

New one-man rocket-powered helicopters that have just flown for the first time include the Rotorcraft RH-1 and Kellett KH-15. The U. S. Army will test a pilotless helicopter (see page 31).

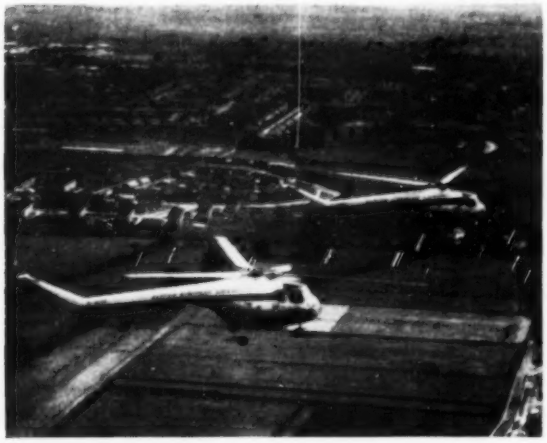
Convertawings' two-engined helicopter is designed to take off and land by rotor power but fly horizontally with the aid of fixed wings.—Aviation Wk

**MOHAWK AIRLINES inaugurates first scheduled air express by helicopter in eastern U. S.—June 21, p88**

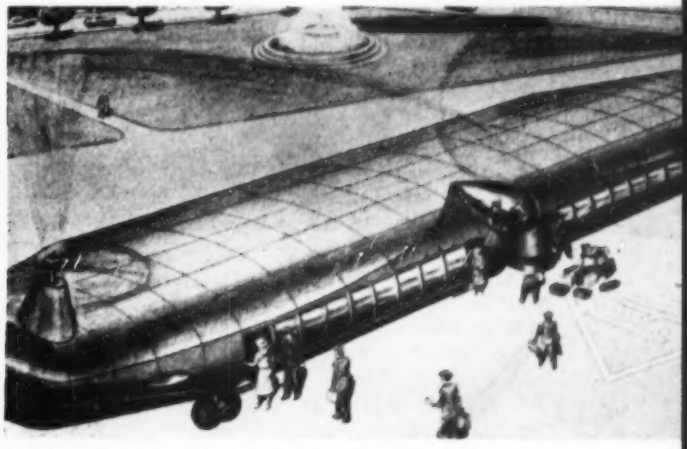


**CONVERTAWINGS' quadrotor helicopter shown here is the prototype of larger models in design.—June 28, p22**

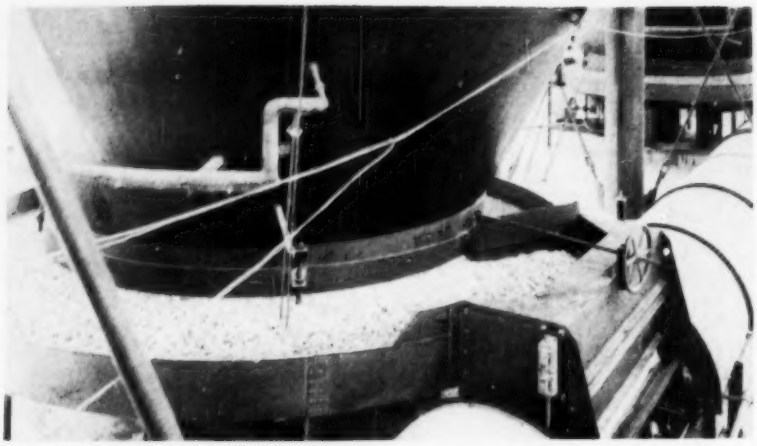
**ROTOR-CRAFT'S rocket-powered RH-1 "Pin-wheel" is here shown in its first test flights.—July 12, p9**



**BRISTOL 171's on London-Southampton service fly at new minimum London height of 500 ft.—July 5, p25**



**BELL AIRCRAFT'S new helicopter will carry 40 passengers. This is an artist's sketch.—June 21, p7**



**ROTARY-PLATE chip feeder, a 17-ft.-dia. unit made by Link-Belt Co., delivers chips from silo to conveyor leading to digester at a St. Regis Paper Co. mill**

# Paper-Mill Productivity

**You can increase productivity by building a new mill or applying these ideas listed here to improve the operation of your present mill by as much as 20%**

As COMPETITION in the paper industry grows throughout the world, mills will necessarily try to raise their level of productivity. Old mills can increase their productivity by 20% through better integration of equipment and processes. At the same time, they improve pulp quality.

• **Wood Utilization**—Higher productivity must begin by finding means to use more wood from the trees. The new methods for raising productivity include:

1. Better debarking of sawmill logs and irregularly shaped sticks. Careless debarking and cleaning can result in loses up to 15% of the pulpwood. A desirable trend is to move barking and chipping operations into the woods where they can be integrated with sawmill operations. Result is better utilization of sawmill and logging wastes.

2. Selection and design of equipment to obtain chips of uniformly small size from slabs, edgings, and trimmings to increase the per volume digester yield.

3. Development of ways to use the bark, which represents from 10 to 15% of the volume of unbarked wood. As size or quality of pulpwood decreases, bark volume increases.—p139

• **Woodyard Operations**—Productivity in woodyards can be increased by:

1. Standardization of methods and types of equipment. At present, almost all stackers are made to customer specifications and most mills use at least three different types of conveyor systems.

2. Better correlation between equipment capacity and actual requirements.

3. Better integration of equipment. Relative capacities of conveyors, stackers, chippers, and barkers should not differ too widely.

4. Woodyard layout should allow straight-line movement of all materials to avoid back-tracking and duplication of conveyors.—p141

• **Chemical Pulping**—Productivity in chemical pulping is affected by (a) obtaining maximum pulp yield per individual digester charge or (b) increasing the digester cycle rate. An optimum balance exists between the two factors; some mills, with easy access to an unlimited pulpwood supply, may find it profitable to operate at a high digester cycle and a correspondingly low yield level per charge. But most mills operate at a high yield level per digester charge.

**High yields** per charge are given by:

1. Small chips of uniform size and high density.

2. Use of a chip packer. Faulty charging can cut yield by as much as 40%.

3. Uniform pulping conditions throughout the charge. Otherwise, chips are overcooked in some areas, undercooked in others.

4. Optimum concentration of cooking liquor.

**High cycle rates** are obtained by shortening:

1. The charging period, consistent with orderly chip arrangement.

2. The penetration period by using small ships of uniform size, uniform moisture content, high operating pressure.

3. The cooking period by operating at the best temperature for rapid removal of lignin and minimum removal of cellulose from the charge.

4. The discharging period, which is mostly determined by discharge method.—p144

• **Paper Machine**—The modern paper machine shows a high degree of performance. But there is still room for improvement, such as:

1. New concept of wet ends of both cylinder and fourdrinier should give greater speed, better formation, less directional sheet.

2. High-speed cylinder machines are needed. Within the next few years, speed should increase to from 800 to 1,000 ft. per min.

3. New developments should improve on-the-machine coating methods.

4. A continuous starch cooker should be developed for effective integration with the on-the-machine sizing operation.

5. Better drying methods are needed as the output of most mills is limited by their dryer capacity. Auxiliary drying equipment or increasing the dryer capacity by other means, such as adding film-forming amines to the steam in the dryer rolls, can increase drying capacity.—Paper Ind, May, p156

# AT THE FOURTH EUROPEAN MACHINE TOOL EXHIBITION

## See *Fellows*

**Machines and Tools for PRECISION Gear Production and Inspection**

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**SEPT. 14-23, 1954**
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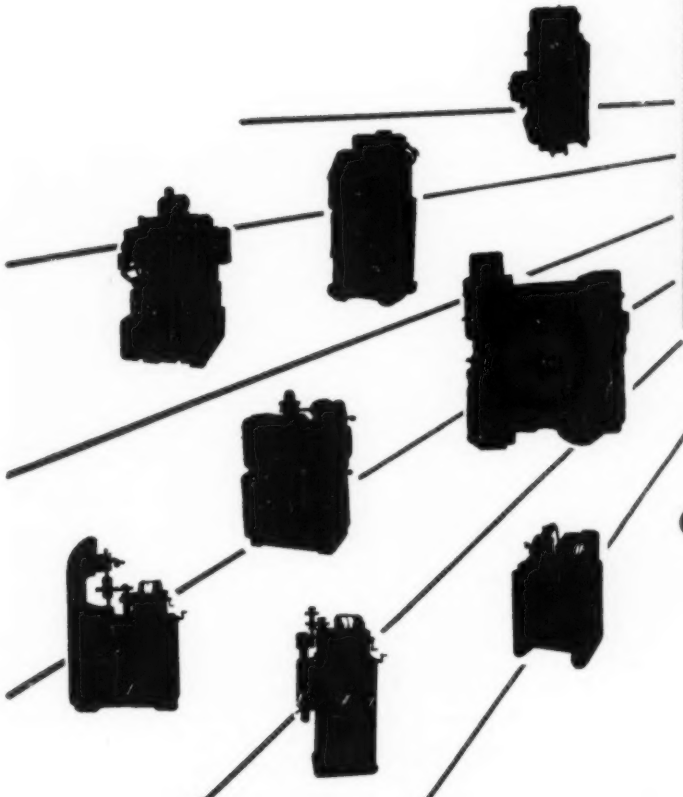


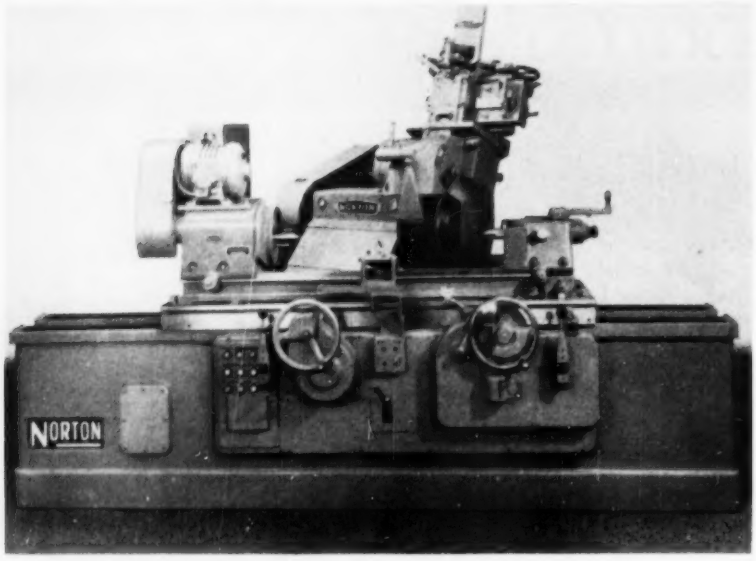
● Also Plastics Injection Molding Machines

**THE FELLOWS GEAR SHAPER COMPANY**

HEAD OFFICE AND EXPORT DEPARTMENT

78 River Street, Springfield, Vermont, U.S.A.

# NEW PRODUCTS




## Semiautomatic Angular Grinder Eliminates Second Operation

Type CV-4 semiautomatic angular wheel slide grinding machine grinds thrust surfaces and adjacent diameters with one plunge cut. It lowers grinding costs by eliminating the second operation necessary for such jobs with conventional cylindrical grinders. The grinder also produces a concentric grain pattern in the ground finish.

The machine is available in 10- and 14-in. swings and for work lengths to 36, 48 or 72 in. It features fast sizing and simplified operation. A wheel-feed mechanism with hydraulically rotated, micrometer-screw feed gives fast, accurate sizing. A "click-count" index in the mechanism allows settings as fine as 0.0001 in. to be made instantly and without visual attention.

Normal operation requires three simple actions: the operator loads the machine, touches a control (to start the automatic cycle), and removes the work. The result is a high production rate.

When the wheel needs truing, the operator simply pushes a button to start the automatic truing device (optional equipment). The device reduces wheel cost per workpiece ground by controlling the amount of abrasive removed.

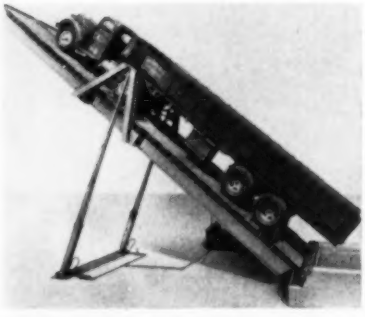
Type CV-4 takes heavy work loads and rough-grinds or finish-grinds with equal ease. Its heavy-duty wheel spindle unit shows extreme resistance to grinding pressures and deflection. — **Norton Behr-Manning Overseas Inc., Worcester 6, Mass.**

### Butyl-Molded Transformer

New butyl-molded JCA-O miniature current transformer features both window-type and bar-primary construction. It is designed for operating meters and instruments, can be used on either single-phase two-wire or polyphase circuits, and is rated up to 600 volts. Its molded butyl serves as insulation, support, and casing.—**International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**

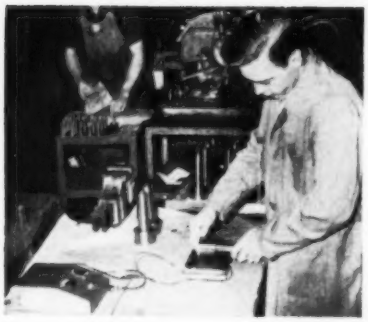
### "Pull-it" Fire Extinguisher

Rubber-tired, ball-bearing "Pull-it" cart is designed to carry dry chemical fire extinguishers. Particularly suitable where fire hazards are widely dispersed, it can easily negotiate narrow factory aisles. Addition of rubber hose permits operation of the extinguisher from the cart.—**Ansul Chemical Co., Marinette, Wis.**



### Hydraulic Truck Dumper

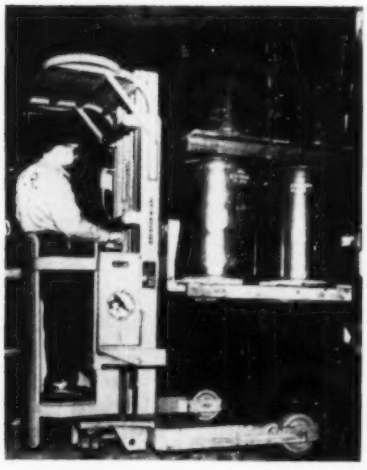
Hydraulic dumper for trucks and semi-trailers up to 54 ft. long lifts vehicles with gross weight of 80,000 lb. to a 40° angle in 60 sec. and lowers them in 40 sec. It has two 20-hp. motors directly connected to hydraulic pumps; either can lift the platform and fully loaded truck. Two four-sleeve hydraulic telescoping cylinders pivot at the base of A frames on either side of platform. Remote control permits one-man operation.—**Link Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.**



## Electro-Chemical Marker

Device is designed for production marking or individual identification. It will mark hardened and ground surfaces, aluminum, stainless steel, zinc, copper, steel, as well as most platings.

Called E-Z Mark Etcher, it consists of a power unit and a separate tray attachment offering a simple, quick and economical method of etching metals. Controls consist of a starting switch and a rheostat to control density of the etch.—**Crown Industrial Products Co., 713 Amsterdam St., Woodstock, Ill.**



## More Operator Safety

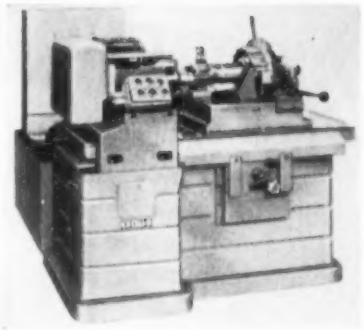
Model M fork truck has design features that give extra safety and protection to the operator. A wrap-around compartment of steel shields operator against collision, eliminating major hazard of narrow-aisle truck operation.

Electric foot brake allows operator to control braking action without bending his knee. Releasing pressure on his left heel applies the brake.

Truck is available in both high- and low-lift models. Capacities are 2,000 lb. and 3,000 lb. for high-lift models. Low-lift has 4,000-lb. capacity.—**Lewis-Shepard Products, Inc., Watertown, Mass.**

## Wire Insert Protects Belt

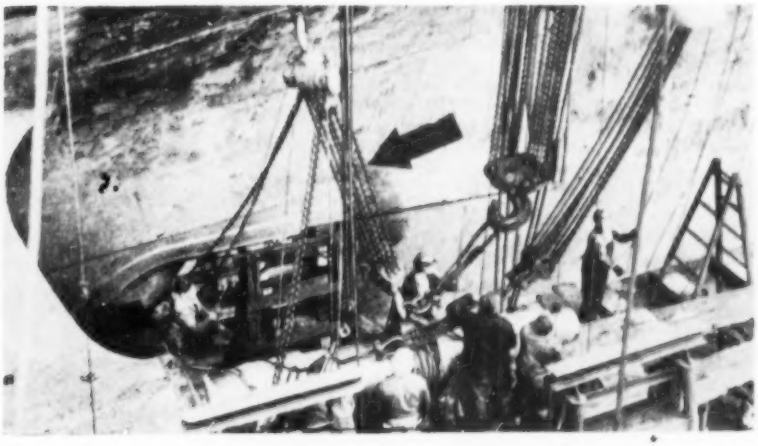
Ribbons of high-tensile steel wire, inserted at intervals up to 3 ft., feature a new type of rubber conveyor belt. Wires act as barriers against rips that can occur in severe belt service when sharp objects penetrate the belt, become jammed, and slice the belt like a knife.—**B. F. Goodrich Co., Akron, Ohio.**



## Bor-Dril Machines Holes With Gun-Type Drills

Bor-Dril is a method of using gun drills to drill holes from solid parts, especially those too long for single-tool boring, and holes in which finish size is difficult to maintain. The drills usually rotate, while the work is stationary. On small parts, rotating the work may be more practical. Coolant under high pressure is applied through the drill.

On the setup shown, an Ex-Cell-O precision boring machine is drilling 15 holes from a solid SAE 4340 aircraft part. Holes are $\frac{1}{2}$ in. in dia. and $3\frac{3}{4}$ in. long. Tolerance is 0.001 in. Machining time is 4 min. per hole.—**Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.**



## New Chain Hoist Handles 25 Tons

**All-purpose chain hoist can handle up to 25 tons. Sealed construction makes it suitable for use under practically all atmospheric and operating conditions. No maintenance other than refilling wick oiler is needed. Non-fouling hand chain guide permits hoist use from any angle. Eleven models ranging from 5- to 25-ton capacities are available. The new 25-ton hoist (arrow) is shown in operation with a hoist of similar capacity.—American Chain & Cable Co. Inc., 230 Park Ave., New York 17, N. Y.**

# SHATTERPROOF!

**Star "Molyflex"—the shatterproof high speed steel hack saw blade—cuts 5 to 10 times more metal than standard steel blades, yet is unbreakable when used in a frame.**

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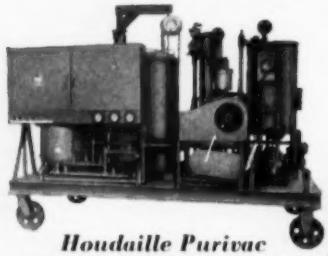
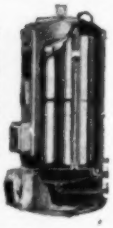


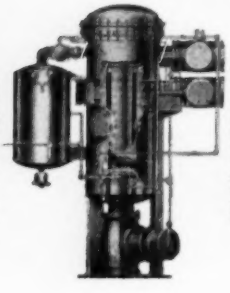
*Houdaille Purivac*

Purifies, dehydrates and degasifies insulating oil in one automatic operation. Operates in the field (while electrical equipment is in service) or at a central station. Eliminates transformer cleaning, reduces corrosion and deterioration of fabric insulation, restores dielectric strength of oil.



*purifiers*

Available in many types and sizes to provide needed range in capacity. Use bulk refill or handy, interchangeable cartridges. Remove all types of contamination including dirt, sludge, acids and products of oxidation.



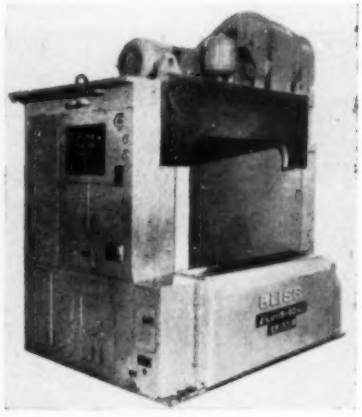
*clarifiers*

Automatic or mechanical units meet all filtering requirements of small or large central coolant systems. Remove abrasives and other solids from oils and coolants used in grinders, broaches, boring machines, etc.

## Large-Size Harvester

Model 100 ALL-CROP harvester is a self-propelled unit designed for harvesting large acreages. It can harvest small grains, grass and legume seed, sorghums, flax, beans, and other crops.

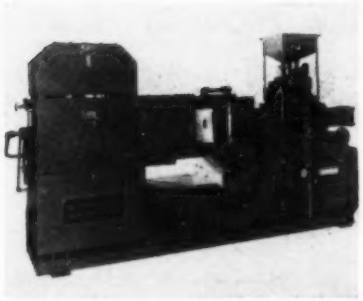
The machine has a 9-ft. header and it can be equipped with a 3-ft. extension to increase cutting width to 12 ft. for short straw and headed-grain areas only. Bin capacity is 35 bushels. Unloading, with the harvester traveling or stationary, takes 1½ min. Overall dimensions are 21⅓ x 12½ x 10⅓ ft.—**Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.**




## High-Speed Welding Press

Welding press is designed for automatic assembly of large metal sections. All piping, controls, and wiring are located inside its streamlined frame.

Two models are available, one for shops with limited headroom and the other where headroom is not important. Beds are 12 in. deep with widths ranging from 42 to 84 in. Strokes are 8 and 10 in. or 8 and 12 in.—**E. W. Bliss Co., 1375 Raff Road, Canton, Ohio**



## Plastics Molding Machine

Fully automatic injection molding machine has 6- to 8-oz. capacity. The machine will cycle up to 400 times an hour, depending on molded-part design. Featured are a straight-line full-hydraulic mold clamp with fast closing and opening speeds and automatic slowdowns prior to mold contact, at mold breakaway, and during ejection of molded parts.

The entire injection unit is mounted on ways and is actuated by a single hydraulic cylinder. This provides hydraulic retraction and advance of the nozzle. A positive sprue break, hydraulically actuated, can be used at the option of the operator.—**Hydraulic Press Mfg. Co., Mount Gilead, Ohio.**

## Magnetic "Fanner"

Small, low-cost magnetic "fanner," Model SF-01, is designed especially for separating very lightweight metal blanks, tin plate, can lids. Placed adjacent to a stack of can lids, for example, the powerful permanent magnetic unit induces like polarity in the lids, causing them to repel each other so that the upper pieces rise in the air and are suspended there, separated from each other. Device facilitates handling.—**Eriez Manufacturing Co., Erie, Pa.**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WITH

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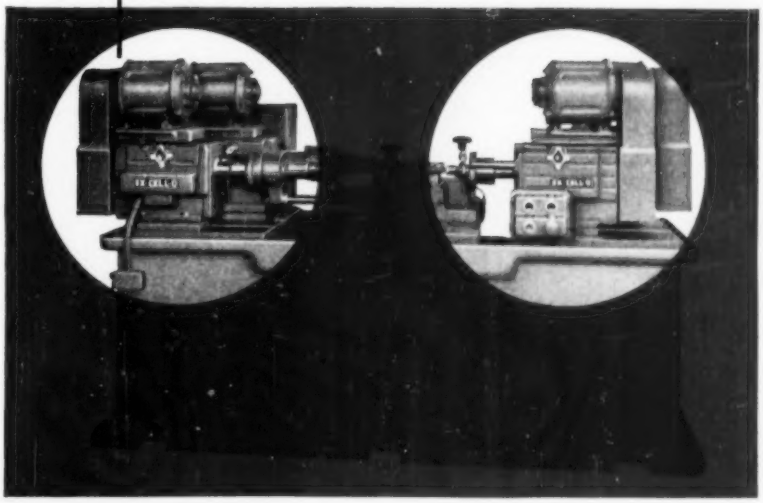

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## NEW PRODUCT BRIEFS

**Conductivity Cells**—Electrolytic conductivity cells, for use with Dynalog conductivity instruments, are designed for high and low conductivity measurements to detect concentration of acids, bases, and salts in solution. Chemicals may be present as contamination or as useful ingredients as in bleaching or pickling operation.—**Foxboro Co., Foxboro, Mass.**

**Electric Sander-polisher**—Heavy Duty electric sander and polisher made by Wen Products Inc., Chicago, features a new-type motor affording smooth action with minmum vibration. It gives straight-line performance over an area of 13¾ sq. in. Sander weighs 2½ lb. and operates on 105-125 volts, 50-60 cycles ac.—**Scheel International Inc., 4237 North Lincoln Ave., Chicago 18, Ill.**

**Improves Concrete Mixing**—Electric counting device for transit-mix concrete trucks gives more positive control over mixing operation. Switch mounted near drum actuates counter for each drum revolution.—**Minneapolis - Honeywell Regulator Co., 2747 Fourth Ave. S, Minneapolis 8, Minn.**

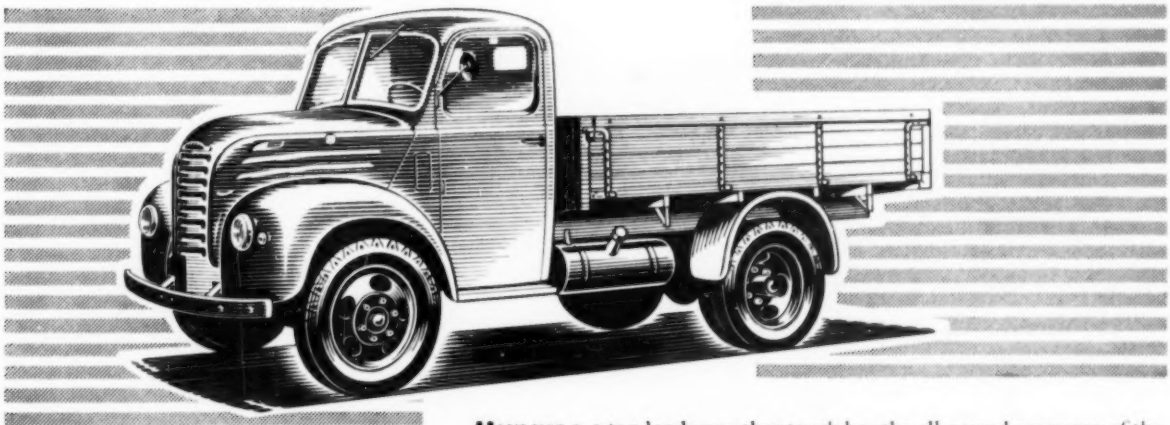
**Adds Chlorine** — Model A-701 chlorinator for water purification features dual orifice meter, feed ranges up to 100 to 1, linear-scale reading of chlorine flow rate, and automatic controls. Capacity is 1,000 lb. per 24 hr.—**Wallace & Tiernan, Inc., Belleville 9, N. J.**

**Boosts Production**—Torque converter added to HRC tractor-shovel aids output. Unit has a four-wheel drive with bucket capacity of 1 1/3 yd. heaped. Either gasoline or diesel engines are available. Transmission provides four speeds in forward and reverse.—**Frank G. Hough Co., 923 Sunnyside Ave., Libertyville, Ill.**

**Meter Measures Sound**—H. H. Scott model 410-B sound-level meter measures noise intensity. It shows where unchecked noise in a shop can lead to hearing loss, poor efficiency, more accidents.—**Rocke International Corp., 13 East 40th St., New York 16, N. Y.**

# Mr. Transport Chief—

## YOUR LOW CONTRACT TENDERS PAY BETTER THIS WAY



HAULING 2-3 ton loads no other truck has the all-round economy of the Thames 4-Cylinder 'Cost-Cutter'. Its outstanding saving guarantees a bigger profit even on your contract-clinching low bids. For this truck has *exactly the right power for the job.* It has too the precision-built design to keep it *on* the job longer with less maintenance.

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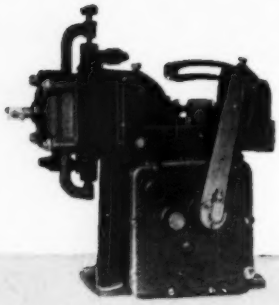

*dependability for*

*every*
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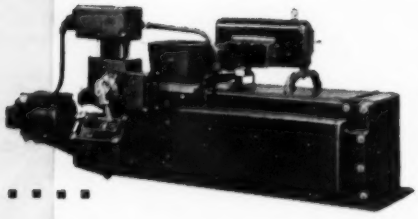

In 1945 three controlled fluoridation studies were initiated in the United States and Canada. Two of these installations — Newburgh, N. Y., and Brantford, Ontario — were equipped with Wallace and Tiernan Fluoridators.

Since that time Wallace & Tiernan has continued to develop a complete line of Fluoridators and accessory equipment. Into this development have gone the experience, precision manufacturing technique and research which helped devise Chemical Feeders of all types in the past forty years.

An indication of the present world leadership of W&T Fluoridators is the hundreds of W&T Fluoridation installations now operating or in preparation. Whether the daily water consumption of your community is hundreds or millions of gallons, there is a W&T Fluoridator to meet your fluoridation requirements.

When you consider fluoridation, communicate with Wallace & Tiernan. There's no obligation.

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## Good Product Labeling Can Avoid Improper Use

Assume you have a new product. It's simple to use—but its use might be hazardous. Then your job is to get the consumer to use it safely and properly. How do you do it?

**Much of the job** can be done by proper labeling — by including complete information right on the package. Labeling, therefore, assumes greater importance, particularly in the chemical-specialty field, than just eye appeal. Here's what it can do:

- Reduce injury hazards through emphasis on safe product use.
- Enable the consumer to get best results and satisfaction.
- Reduce sales loss from unfavorable publicity.
- Make it easier, in some countries, to get liability insurance.
- Prevent possible expensive oversight of laws regulating products and packages.

**Consumers do read labels.** But it may not be enough to warn; it may be necessary to explain. The consumer that thinks an aerosol shouldn't be stored where it might become overheated only because it might spoil would be rudely awakened if the unit exploded.—Chem Wk, June 19, p86

## Method Saves Diamonds

Radically changed carbide-tool resharpening methods at International Harvester Co.'s Fort Wayne Works save carbide and reduce diamond-wheel wear.

**Rough grinding** is kept to a minimum—only enough to remove full cutting edges. What remains of the old chipbreaker is left intact. Both rough and finish grinding on clearance and top rake are done with silicon carbide and diamond wheels in conventional offhand operations.

**The chipbreaker** is then ground in a conventional chipbreaker grinder to full depth and width in one pass. Chipbreaker length is limited to the depth of cut to be taken by the tool. Grinding the shorter chipbreaker prolongs wheel life considerably. — Am Mach, May 24, p113

# MANAGEMENT REPORT

**Industrial television's possibilities** are limited only by your imagination. With its closed circuit, ITV can bring almost any operation—no matter how remote, hot, cold or dangerous—under the gaze of the human eye. As techniques are refined, it will be part of the automatic machines of the future.

**ITV can take you places you can't go.** If you keep that thought in mind, you will stay abreast of the current trend toward wider use of modern technology in today's plants. It's an important possibility that can help you speed, simplify, or improve your plant production.

**If you visit the World's Fair at Sao Paulo, Brazil,** this year (Aug 21-Jan 25), look for the U. S. exhibit, "Atoms for the Benefit of Mankind." It will show what strides have been made in peaceful application of atomic energy and disprove graphically the Communist untruths about the U. S. position on use of atomic energy.

**Included in the exhibit** will be a display, contributed by American Machine & Foundry Co., that will illustrate the application of a "packaged" atomic power plant. Components of such a plant could be transported to a remote area and there reassembled to provide power otherwise inaccessible.

**Not one lost-time accident in 2 years**—in a plant employing 1,000 workers for 4.6-million consecutive man-hours! This is the record achieved by General Food Corp.'s Maxwell House plant at Hoboken, New Jersey. How?

**One big factor** was the appointment of a full-time safety director to advise top management and coordinate the program. Safety measures were executed by foremen and supervisors, aided by employee committees in all ten departments.

**Frequent meetings of all concerned** resulted in such safety measures as:

- Signs that warn of dangerous areas or obstacles.
- Vivid painting of hazardous obstructions.
- Painting backgrounds of safety guards red—to catch the worker's eye if any guard is missing.
- Safety controls to stop machines when accident guards are not in place.
- Grounding of all machinery to prevent static—for though not itself dangerous, a static shock can cause a worker to fall or, through reflex, be otherwise injured.—Food Eng, July, p69

**Modern space planning cut down occupied space** from 26,000 to 16,000 sq. ft. at American Locomotive Co., New York. Entire cost of renovating the offices will be paid for in 8 years by the resulting savings in rent. Planning was done by Ebasco Services, Inc.

**The approach** was to put each individual person, section, and department in a strategic location in relation to each other person, section, and department. This has resulted in increased efficiency as well as reduced space. Individual offices were planned on the basis of work to be done in them. Differences in importance are emphasized by the selection of furnishings.—Am Business, June p6

**It's "RAPP with WOMA—and the Missing Link."** This may sound like an anthropologist's delirium. Actually, it's a unique sales scheme thought up by Arizona Public Service Co. The explanation:

- **RAPP** (Reddy Appliance Purchase Plan). Under this, employees can purchase APS appliances through cooperating dealers at 20% discounts, providing they agree to —
- **WOMA** (Word-of-Mouth Advertising). Each employee-purchaser gets five prospect cards from his dealer; he returns them with names of neighbors or others who have been shown the appliance in his home. Now comes—
- **The Missing Link.** This refers to inadequate home wiring or plumbing that may prevent new prospects from installing appliances. APS will help supply the "Missing link" on easy terms.

**In the plan's first 5-months' operation,** employees bought 552 major APS appliances worth $144,000. And WOMA brought in hundreds of additional sales prospects.—Elec World, June 28, p110

**If you're planning a new plant** or a relayout of your present plant, here's an idea that Food Machinery & Chemical Corp. has found handy. Usually scale models for plant layout are placed on large tables. When a model is over 6 ft. wide, making changes in the center can prove awkward.

**The easy solution is to hang the model.** Paint an aluminum sheet white, scribe it in ¼-in. squares, and hang it on the wall of your planning room. With building wall and columns painted in, you can attach colored-paper layouts with cellophane tape and make changes quickly.—Am Mach, June 21, p165

**Award of merit by Research Institute of America** went to Arnold Bakers Inc., Port Chester, N. Y., for the company's appointment of a management representative who is constantly on the production floor to handle employee problems.

**His duties** go far beyond those of the usual personnel assistant. He does not bypass either the supervisor or the shop steward, but consults with both before making any recommendations.

# PRODUCTION IDEAS

## from Manufacturers' Catalogs

**Irrigation Pumping**—Bulletin GEA-5917B contains information on selection and application of electric equipment for irrigation pumping. Bulletin GEC-1023 presents data on various motors and controls used for irrigation pumping.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

**Woodworking Machines**—The outstanding features of De Walt's radial arm saws, Models GA and R-2, are described in two catalogs.—American Machine & Foundry Co., De Walt Prods. Div., 261 Madison Ave., New York 16, N. Y.

**Pyrometer Supplies**—Pyrometer supplies are described and illustrated in the revised Buyers Guide 100-5. General thermocouple assemblies and components are also listed.—Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis 8, Minn.

**Geared Turbine Generators**—Bulletin 1969 describes engineering and construction features of turbine generators, 200 kw. to 1500 kw., for both alternating-current and direct-current service.—Worthington Corp., Harrison, N. J.

**Pickup Trucks**—Catalog E-64-D, on the International "One Hundred" series pickup trucks, contains information on features available.—International Harvester Export Co., 180 N. Michigan Ave, Chicago, Ill.

**Land-clearing Equipment**—Catalogs contain descriptive information about LeTourneau's mobile tree saw and heavy-duty LC tractor.—R. G. LeTourneau, Inc., Longview, Texas.

**Adjustable Metal Framing**—What Unistrut steel channels and fittings can do with minimum time and effort is described in catalog.—Export Div., Pressed Steel Car Co., Inc., 25 Broad St., New York 4, N. Y.

**Consulting Service**—"The Inside Story of Outside Help" details Ebasco's services as engineers, constructors, and business consultants.—Ebasco Service, Inc., Dept. D, 2 Rector St., New York 6, N. Y.

**Air-cooled Diesel Engines**—Literature describes the outstanding features of 1- to 8-cylinder air-cooled diesel engines. — Klockner-Humboldt-Deutz AG., Kolon, Germany.

**Oilifts**—Catalog, "Case Studies in Modern Lifting," tells how to solve problems of lifting, loading, positioning, and materials-handling.—Globe Hoist Co., 1000 E. Mermaid Lane, Philadelphia 18, Pa.

**Tubing**—Catalog describes characteristics and many uses of Bundyweld copper-coated steel tubing in sizes up to ½-in. OD.—Bundy Tubing Co., Detroit 14, Mich.

**Office Copying Machine**—Literature is available on new Bambino copying machine.—General Aniline & Film Corp., Antara Div., Johnson City, N. Y.

**Grinding Mills**—Data on complete installations for any type of grinding mill is given in bulletin 07B6718A.—Allis Chalmers Mfg. Co., General Machy. Div., Export Dept., Milwaukee 1, Wis.

**Glass Tubing**—Variety of characteristics, dimensions, and applications can be found in glass tubing. "Glass and You" tells about them.—Corning Glass Works, Export Dept. 4A, 119 W. 57th St., New York 19, N. Y.

**Industrial Scales**—Catalog T 10 describes wide selection of types and capacities of Printweigh Scales that print accurate weights and help you keep records.—Toledo Scale Co., Toledo 1, Ohio.

**Industrial Equipment**—Detailed information is available on rolling mills, steel grating, transit mixers, and road pavers for construction and general industry.—Blaw-Knox Co., Export Dept., 405 Lexington Ave., New York 17, N. Y.

**Aluminum Handbooks**—Ten handbooks, Designing with Aluminum Extrusions, Aluminum Structural Design, Fastening Methods for Aluminum, Finishes for Aluminum, Aluminum Data Book, Aluminum Powders & Pastes, Aluminum Forming, Machining Aluminum Alloys, Heat Treating Aluminum Alloys, and Welding Aluminum, contain technical information on any and every aspect of aluminum use. Ask for the ones you want on your company letterhead.—Reynolds Metals Co., Export Div., 19 East 47th St., New York 17, N. Y.

**Presses**—Hydraulic wheel mounting and dismounting presses are described and illustrated in bulletin 531-A.—Watson-Stillman Co., 150 Aldene Rd., Roselle, N. J.

**Tools**—Catalog 27312 covers boring machines, broaches, counterbores, lapping machines, cutting tools, dairy equipment, hydraulic power units, railroad equipment, and grinders.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

**Gear-shaving Machines**—Bulletin S 53-7 describes new development in gear shaving. Automatic differential up-feed and conventional crowning now available on Model GCU.—National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.

**Microhoning Equipment** — Catalog 5/Mi contains complete information about microhoning equipment.—Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 38, Mich.

**Electric Hammer**—Bulletin contains complete information about the Model "500 Super Slugger" electric hammer.—Noble & Stanton, Inc., 1000 Broadway, Bedford, Ohio.

**Vertical Turret Lathes**—Outstanding features of single-column vertical lathes are described and illustrated in catalogs No. 6513 and No. 4013E.—Schiess Aktiengesellschaft, Hansaallee 289, Dusseldorf-Oberkassel, Germany.

**Hydraulic Truck Dumper**—Folder No. 2428 provides information about a hydraulic dumper for trucks and semi-trailers.—Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

**Panelboard Planning**—Planning commercial and industrial circuit-breaker panelboards is discussed in booklet B-6098.—Westinghouse Electric International Corp., 40 Wall St., New York 5, N. Y.

**Industrial Machinery**—Literature is available on engines, crushers, hoists, grinding mills, and railway maintenance machinery.—Nordberg Mfg. Co., Milwaukee 1, Wis.

**Electronic Equipment**—Full information is available on all types of electronic equipment (radar, marine, microwave, and industrial).—Raytheon Mfg. Co., International Div., 589 5th Ave., New York 17, N. Y.

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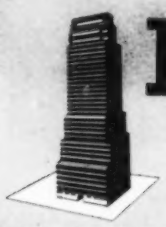

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2. **Carroll—TIMESTUDY FOR COST CONTROL, 3/ed., 301 pages, 1954 . . . . . $5.75**
   Ideal for small plants, this is a practical manual of timestudy and control based on predetermined standards. Procedures from how and where to begin to the application of data in production control are given.

3. **Compressed Air and Gas Institute—COMPRESSED AIR HANDBOOK, 2/ed., 408 pages, 1954 . . . . . $8.75**
   This is a complete reference book on all phases of industrial air and gas compressors and compressed-air-powered portable tools and rock drills used by industry.

4. **King and Brater—HANDBOOK OF HYDRAULICS, 4/ed., 563 pages, 1954 . . . . . $8.75**
   Containing compact tables and other reference data, this hydraulic engineering text covers every phase of common practice and many special problems. Rules, formuals, and diagrams are given with material explaining their practical applications.

5. **Blocker and Weltmer—COST ACCOUNTING, 3/ed., 623 pages, 1954 . . . . . $7.25**
   Clear and up to date, this complete cost accounting book sets forth the objectives and procedures of cost accounting from a managerial point of view.

6. **Soroka—ANALOG METHODS IN COMPUTATION AND SIMULATION, 390 pages, 1954 . . . . . $8.25**
   Clear and precise, this text encompasses the entire field of analog computers and computing, and describes mechanical, electromechanical, electrical, and electronic analog components for performing basic mathematical operations.

7. **Folts—INTRODUCTION TO INDUSTRIAL MANAGEMENT, 4/ed., 684 pages, 1954 $7.75**
   Emphasizing the managerial aspects of industrial management problems, this book deals with business and economic conditions in industry, with theory presented as background material for the solution of practical situations.

8. **Allen, et al.—PRICES, INCOME, AND PUBLIC POLICY, 418 pages, 1954 . . . . . $5.75**
   This is a well-balanced, succinct treatment of the basic principles of economics and their applications to problems of public policy.

9. **Finlay, et al.—HUMAN BEHAVIOR IN INDUSTRY, 247 pages, 1954 . . . . . $4.50**
   Practical and non-technical, this new book realistically examines people at work and investigates the causes for their behavior.

10. **Wulfeck and Bennett—THE LANGUAGE OF DYNAMIC PSYCHOLOGY AS RELATED TO MOTIVATION RESEARCH, 111 pages, 1954 . . . . . $4.50**
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**2. To present the material** in such a way that busy plant operating men will want to read it and will find it quick and easy to absorb. That takes a full measure of journalistic experience combined with an understanding of industrial operations — and, in many cases, engineering training — on the part of seven more planning, writing, and copy-preparation editors, plus two graphic presentation specialists.

**3. To get readers to act** on what they read. *Factory* not only tells how to do a thing; it gives the information that will allow readers to judge why and whether it should be done in their plants. This means emphasis on results, benefits, and limitations.

**M. J. Murphy, Editor**
Factory Management and Maintenance

In addition, *Factory* presents frequent articles on how plant operating executives can more effectively sell their ideas and "themselves"—to other executives at their own level, to financial policymakers, to the labor force.

Finally, *Factory* presents each month a variety of "capsule-style" departments covering new equipment, new catalogs, labor and business trends, maintenance costs, and news of important ideas and developments in each of its specialized fields.


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*Construction Methods & Equipment*
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*Pharmacy International*
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*Textile World*
*The American Automobile (Overseas Edition)*
*The Welding Engineer*

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**Chestnut and 56th St., Philadelphia 39, Pa.**
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**30 Church St., New York 17, N. Y.**
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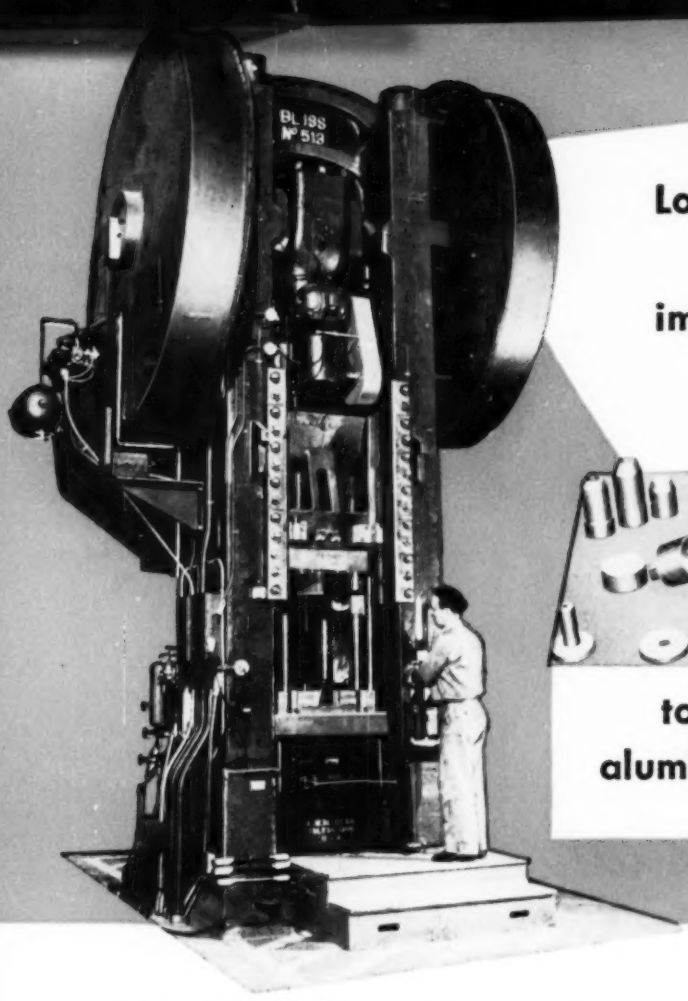
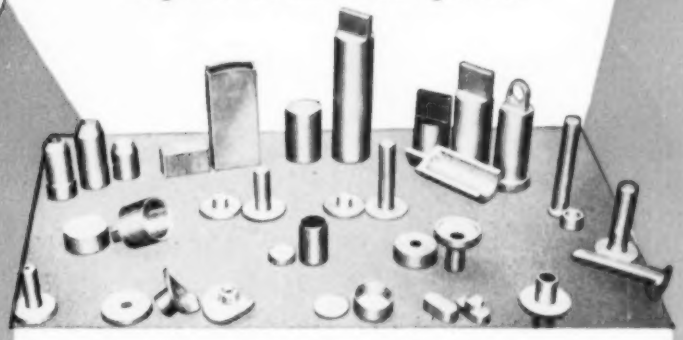


## Lockheed relies on this BLISS 1000 TON impact extrusion press



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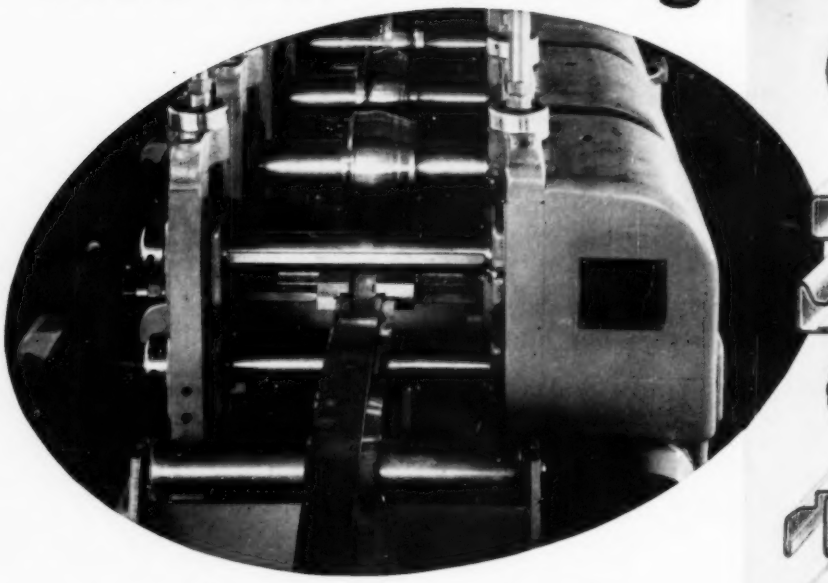

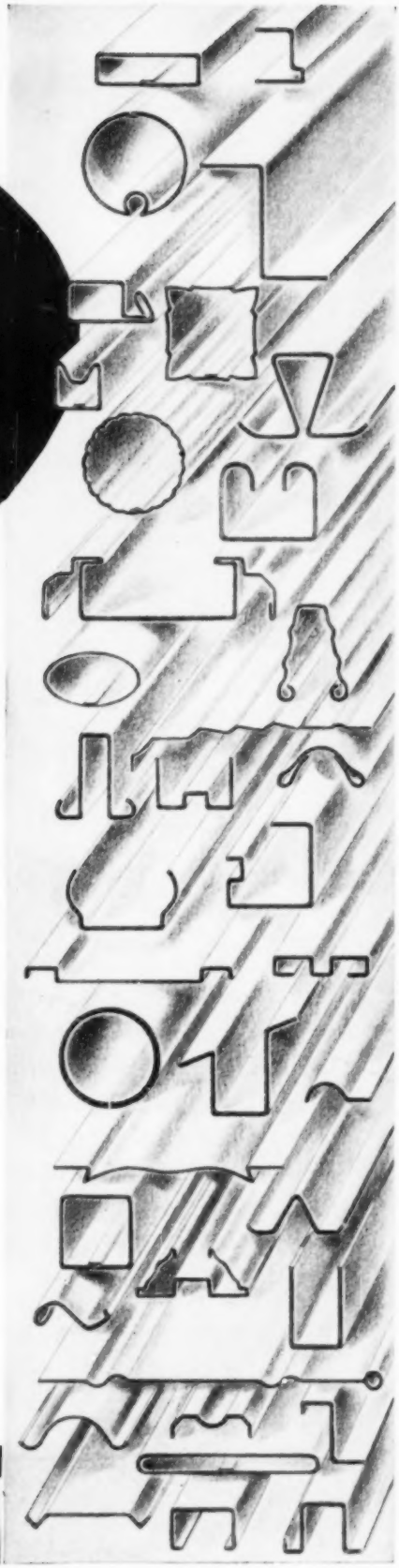

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